

# **Cairns Shipping Development Project:**

## **Coordinator-General's evaluation report on the environmental impact statement**

**February 2018**

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# Contents

<b>Synopsis.....</b>	<b>1</b>
<b>1. Introduction .....</b>	<b>15</b>
<b>2. About the project.....</b>	<b>15</b>
2.1 The proponent.....	15
2.2 Location.....	15
2.3 Project description.....	18
2.4 Project need .....	28
<b>3. Environmental impact statement assessment process.....</b>	<b>29</b>
3.1 State environmental impact assessment process.....	30
3.2 Commonwealth environmental impact assessment.....	32
<b>4. Project approvals .....</b>	<b>32</b>
4.1 Australian government approvals.....	36
4.2 State government approvals .....	36
4.3 Local government approvals .....	37
<b>5. Capital dredging and port upgrades.....</b>	<b>38</b>
5.1 Introduction .....	38
5.2 Existing environment.....	38
5.3 Marine and coastal environment .....	45
5.4 Matters of state environmental significance .....	55
5.5 Queensland cultural heritage .....	63
5.6 Aboriginal and Torres Strait Islander cultural heritage .....	64
5.7 Maritime transport .....	65
5.8 Noise and vibration .....	69
5.9 Air quality .....	76
5.10 Greenhouse gas emissions.....	84
<b>6. Dredge material delivery.....</b>	<b>86</b>
6.1 Introduction .....	86
6.2 Existing environment.....	89
6.3 Matters of state environmental significance .....	91
6.4 Water quality and coastal processes .....	98
6.5 Traffic and transport .....	101
6.6 Noise .....	104
6.7 Aboriginal and Torres Strait Islander cultural heritage .....	110
<b>7. Onshore placement of dredge material.....</b>	<b>111</b>
7.1 Introduction .....	111
7.2 Northern Sands DMPA.....	115
7.3 Tingira Street DMPA .....	148
<b>8. Land use and planning .....</b>	<b>158</b>
8.1 Existing environment.....	158
8.2 Queensland planning framework .....	162
8.3 Coordinator-General's conclusion: Land use and planning .....	170

<b>9. Social impacts .....</b>	<b>171</b>
<b>9.1 Overview .....</b>	<b>171</b>
<b>9.2 Submissions received .....</b>	<b>171</b>
<b>9.3 Community and stakeholder engagement .....</b>	<b>172</b>
<b>9.4 Workforce management.....</b>	<b>174</b>
<b>9.5 Housing and accommodation.....</b>	<b>175</b>
<b>9.6 Local business and industry content .....</b>	<b>176</b>
<b>9.7 Health and community wellbeing .....</b>	<b>176</b>
<b>9.8 Coordinator-General's conclusion: Social impacts.....</b>	<b>178</b>
<b>10. Economics .....</b>	<b>179</b>
<b>10.1 Submissions received .....</b>	<b>179</b>
<b>10.2 Existing environment.....</b>	<b>179</b>
<b>10.3 Methodology.....</b>	<b>180</b>
<b>10.4 Potential impacts.....</b>	<b>181</b>
<b>10.5 Coordinator-General's conclusion: Economics .....</b>	<b>184</b>
<b>11. Conclusion .....</b>	<b>184</b>
<b>Appendix 1. Imposed conditions.....</b>	<b>186</b>
<b>Appendix 2. Coordinator-General's stated conditions.....</b>	<b>188</b>
<b>Appendix 3. Coordinator-General's recommended stated conditions .....</b>	<b>286</b>
<b>Appendix 4. General recommendations .....</b>	<b>290</b>
<b>Appendix 5. Terms of reference for Technical Advisory Group.....</b>	<b>294</b>
<b>Appendix 6. Proponent commitments .....</b>	<b>302</b>
<b>Acronyms and abbreviations .....</b>	<b>315</b>
<b>Glossary .....</b>	<b>319</b>

## Figures

Figure 2.1 Project location .....	17
Figure 2.2 Proposed shipping channel and swing basins dredging depths and widths.....	20
Figure 2.3 Dredge mooring and pump-out facility and delivery pipeline .....	22
Figure 2.4 Northern Sands DMPA layout.....	24
Figure 2.5 Tingira Street DMPA layout .....	25
Figure 5.1 Seagrass Monitoring Meadow Condition in Cairns Harbour .....	42
Figure 5.2 Proposed amendments to the Trinity Inlet declared FHA boundary .....	57
Figure 6.1 Environmental values and project components involved in dredge material delivery.....	88
Figure 7.1 Northern Sands DMPA bund and pipeline layout .....	113
Figure 7.2 Tingira Street DMPA and the Trinity Inlet declared fish habitat area .....	114
Figure 8.1 Northern Sands Project Area – Affected properties.....	161



## Tables

Table 2.1	Proposed dredging depths and widths (Source: RDEIS Chapter A3).....	18
Table 4.1	Key approvals required for the project to proceed (Source: RDEIS Chapter 4) .....	33
Table 5.1	Summary of key components of coastal processes in Trinity Bay and Trinity Inlet (Source: RDEIS Chapter B3) .....	39
Table 5.2	Description of zones of impacts (Source: RDEIS Chapter B5) .....	47
Table 5.3	Vibration impact criteria – human comfort (Source: Draft EIS Chapter B10) .....	70
Table 5.4	Planning level noise criteria for operational noise (Source: RDEIS Appendix AU).....	74
Table 6.1	Background noise levels and derived construction noise level targets (Source: RDEIS Appendix AU) .....	105
Table 6.2	Predicted increases in noise levels above targets from delivery pipeline construction, commissioning and decommissioning (Source: RDEIS Appendix AU) .....	106
Table 6.3	Predicted noise level increases above noise targets for pump-out facility (Source: RDEIS Appendix AU) .....	108
Table 7.1	Design flood levels and likelihood of exceedance for the Barron River (existing conditions) (Source: RDEIS Chapter B17).....	123
Table 7.2	Comparison of RDEIS and supplementary report bund design (Source: RDEIS Appendix AD and Supplementary Report Appendix D) .....	124
Table 7.3	Predicted increase in flood levels (Source: Supplementary Report Appendix D) .....	125
Table 7.4	Cairns region tropical cyclone generated storm tide probabilities (Source: RDEIS Table B3-5).....	129
Table 8.1	Tenure of properties to be affected by the construction of the project (Source: RDEIS Chapter B1) .....	159
Table 10.1	Value added economic benefits from increased expenditure directly associated with the project (2017-2043) (Source: RDEIS Table B9-42).....	181



## Synopsis

This report evaluates the potential impacts of the Cairns Shipping Development Project (the project). It has been prepared pursuant to section 34D of the *State Development and Public Works Organisation Act 1971* (Qld) (SDPWO Act). Separately, the Australian Government Department of Environment and Energy (DEE) will assess the matters of national environmental significance (MNES) and decide on the project under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The proponent, Far North Queensland Ports Corporation Limited (trading as Ports North), a government owned corporation, proposes to deepen and widen the Trinity Inlet shipping channel and upgrade wharves to enable ships up to 300 metres (m) in length to berth at the Port of Cairns. The project would facilitate the growth of cruise, navy and large cargo ship visits directly to the Port of Cairns and allow expansion of the naval base.

Capital dredging of around 1 000 000 cubic metres (m<sup>3</sup>) of sediment material would be undertaken to widen and deepen the shipping channel, the existing Crystal Swing Basin, and create a new Smiths Creek Swing Basin and berth pockets.

Approximately 900 000 m<sup>3</sup> of soft clay dredge material is proposed to be placed at a Northern Sands dredge material placement area (DMPA), within an existing sand mining void. The Northern Sands site is an existing sand mine and a waste disposal and processing facility on the Barron River delta, north of Cairns. This soft clay dredge material is proposed to be delivered from a temporary dredge mooring and pump-out facility offshore from Yorkeys Knob via a temporary 7.5 kilometres (km) dredge material delivery pipeline (the delivery pipeline) connected to the Northern Sands DMPA.

The remaining 100 000 m<sup>3</sup> of material proposed to be dredged is stiff clay. This stiff clay dredge material is proposed to be placed at Tingira Street, Portsmith, on previously reclaimed industrial port land. The stiff clay dredge material would be delivered to Tingira Street DMPA via barges. A crane or excavator would transfer the stiff clay dredge material from barges and place it onto heavy vehicles for haulage to Tingira Street DMPA. The stiff clay dredge material would consolidate to allow re-use of the land.

The on-shore placement of capital dredge material at the Northern Sands DMPA and Tingira Street DMPA is consistent with the *Sustainable Ports Development Act 2015* and the Reef 2050 Long-Term Sustainability Plan (Reef 2050) which prohibit sea-based disposal of capital dredge material and mandates placement of capital dredge material on land. Similarly, capital dredging within the regulated port limits of the Port of Cairns is provided for in the Reef 2050.

Cruise shipping is the fastest growing tourism market worldwide, and cruise ship visits to Cairns have been increasing with 34 cruise ship visits in 2010, 43 visits in 2015, 64 visits in 2016 and 80 visits in 2017. However, there is a trend towards a greater proportion of mega class cruise ships which are too large to access the Port of Cairns. Currently almost half of the cruise ships visiting Cairns are unable to enter the port as the existing shipping channel is not wide or deep enough to allow safe access.

While boutique and mid-class cruise ships can berth at Trinity Wharf, mega class cruise ships must anchor offshore near Yorkeys Knob, 15 km from the Cairns central business district. Passengers are then transported to the central business district (CBD).

Once the project is completed, the Port of Cairns would accommodate the new mega class cruise ships (up to 300 m in length). Potential growth in the cruise ship tourism industry would only be possible if larger ships can access Trinity Inlet. In addition, the project would improve the efficiency of existing cargo shipping operations by reducing current tidal and loading restrictions on bulk cargo ships accessing the Port of Cairns. The project would also enable future expansion of the HMAS Cairns Navy base and enhance existing naval capabilities in the region

The project would require capital expenditure of \$120 million. Key project benefits include:

- facilitating an increase by 103 in the total number of cruise ship visits to Cairns by 2031, including an additional 85 mega class ship visits
- 195 direct full-time equivalent (FTE) jobs over the construction period
- support 1535 direct FTE operational jobs per annum for the regional economy
- \$848.6 million total value to the regional economy from increased expenditure (2017-2043, net present value, 2016–17 dollars)
- improve passenger safety by reducing the number of cruise ship passengers being transported from offshore to Cairns CBD
- no disposal of capital dredge material at sea.

In undertaking my evaluation, I have considered the draft environmental impact statement (EIS), revised draft EIS, issues raised in submissions during the public consultation periods, supplementary information and advice I have received from relevant state and local government agencies.

The following provides an overview of the main issues arising from my evaluation.

### **Capital dredging and port upgrades**

The capital dredging campaign would be undertaken over a 12-week period, between May and September 2019. Dredging of approximately 900 000 m<sup>3</sup> of soft clay dredge material would be undertaken by a Trailing Suction Hopper Dredge (TSHD), while approximately 100 000 m<sup>3</sup> of stiff clay dredge material would be removed by a barge mounted Back Hoe Dredge (BHD). The capital dredging campaign would:

- widen the Trinity Inlet shipping channel up to 20 m, with additional widening at the bend to provide safe manoeuvring
- deepen the Trinity Inlet shipping channel up to approximately 8.8 m below the level of Lowest Astronomical Tide (LAT)
- establish a new Smiths Creek swing basin of a 310 m diameter to enable the future expansion of the HMAS Cairns navy base
- deepen the Crystal swing basin up to approximately 8.8 m below LAT.

The port upgrades include the extension and upgrade of wharves 1-5, and rebuilding wharf 6 to enable larger vessels to berth.

### **Marine and coastal environment**

Marine water quality is an important environment value in Trinity Inlet due to the presence of ecological receptors that are sensitive to changes in water quality conditions. The EIS documentation predicted that short-term (12 weeks), minor changes to water quality are expected to result from turbid plumes generated from dredging within the inner port area. When compared to existing turbidity conditions, the dredging campaign would increase turbidity values at most locations by less than seven per cent while dredging is occurring.

The proponent will establish a technical advisory group (TAG) to oversee dredging for the project. The TAG would be made up of subject matter experts with the responsibility of reviewing data related to water quality and ecosystem health. The TAG would also assist with the design and implementation of the proponent's Dredge Management Plan (DMP) which would define management measures for dredging to protect marine water quality.

Pile driving and construction activities for port upgrades may impact on marine water quality by disturbing and mobilising marine sediments. A Construction Environmental Management Plan (CEMP) was provided in the EIS documentation to address potential port upgrade impacts. The CEMP includes management measures to address potential marine water quality impacts from port upgrades.

I consider that potential impacts to marine water quality would pose no adverse impact due to the temporary nature of the dredging and construction activities and that the potential impacts can be managed effectively. To ensure potential water quality impacts are managed, I have stated conditions for the Environmental Authority (EA) for capital dredging. These conditions set water quality limits and require monitoring at defined sensitive ecological receptors. The proponent is required to finalise the draft DMP, including a sediment plume associated monitoring program and a receiving environment monitoring program. I have also stated conditions requiring independent experts to form part of the TAG.

I am satisfied that my stated conditions and the implementation of the DMP, CEMP and proponent commitments would address the potential impacts resulting from dredging and port upgrades.

I am satisfied that the maintenance dredging requirements of the project are unavoidable and necessary for the ongoing and efficient operation of the Port of Cairns. The EIS documentation identified that the project would result in a minor increase in maintenance dredging volume of two to six per cent. I note that the potential impacts associated with the increased maintenance dredging associated with the project do not exceed that already authorised under the existing statutory approvals held by the proponent.

## **Matters of state environmental significance**

Matters of state environmental significance (MSES) include the Trinity Inlet fish habitat area (FHA), marine plants, coral reefs and protected wildlife.

The habitat values of the Trinity Inlet FHA include mangrove zones, seagrass beds off the Cairns esplanade, patchy areas of saltmarsh and intertidal flats. Approximately 9.21 ha of the Trinity Inlet shipping channel expansion overlaps with the Trinity Inlet FHA. The proponent proposes to adjust the boundaries of the FHA which would result in an increase of the FHA by five square metres (m<sup>2</sup>).

Installing piles for the port upgrades could directly impact approximately 53.76 m<sup>2</sup> of benthic communities (fish habitat). The inner port is a highly mobile fine sediment environment and only supports sparse benthic communities.

The EIS documentation identified potential seagrass habitat in Trinity Inlet and Trinity Bay based on historical records. No seagrass meadows were identified within the Trinity Inlet shipping channel, although, historical records identified 3 ha of potential seagrass habitat within the proposed widening of the Trinity Inlet shipping channel. Water quality modelling predicts that seagrass areas adjacent to the dredging footprint are either in the zone of low to moderate impacts (immediately adjacent to the channel) or the zone of influence where no ecological impacts are predicted.

The nearest coral reef is located five km to the east of the existing Trinity Inlet shipping channel and outside the proposed widening of the Trinity Inlet shipping channel.

The assessment predicted that inshore dolphins, dugongs and turtles may be injured by interacting with moving vessels and dredge equipment during the construction, operation and decommissioning of the project. Underwater noise and vibrations could also affect inshore dolphins' navigation abilities, damage their hearing and deter them from foraging near the piling activities.

I consider that the proponent's commitments and mitigation measures presented in the DMP and CEMP can manage the potential impacts on MSES. I expect the proponent to confirm the area of seagrass to be dredged prior to applying for subsequent approvals.

Any offset requirements for significant residual impacts no matters which are also MNES will be also considered by the Commonwealth Department for the Environment and Energy (DEE). I have stated a condition, for the operational works approval for disturbance to marine plants, requiring the proponent to deliver offsets for any significant residual impacts to MSES not considered as matters of national environmental significance (MNES) by DEE. This will ensure that offset requirements are not duplicated.

I note that amending FHA boundaries is a legislative process requiring a change to the Fisheries Regulation 2008. The Department of Environment and Science (DES) (formerly the Department of National Parks, Sport and Racing) has confirmed support for the proposed amendment. I am satisfied that the proponent has provided sufficient information to assess the potential changes to the Trinity Inlet declared FHA.

I am satisfied that the stated conditions, proponent commitments and mitigation measures outlined in the EIS documentation would ensure the potential impacts on MSES as a result of dredging and port upgrades are managed appropriately.

### **Maritime transport**

The TSHD and BHD are proposed to operate 24 hours, seven days a week during the 12-week dredging campaign. Dredging activities, port construction activities and operational vessels may impact on vessel navigation and safety. I am satisfied that the mitigation measures proposed by the proponent would ensure that all vessel traffic can be effectively managed. To ensure this, I have recommended conditions requiring the proponent to consult with Maritime Safety Queensland to further develop mitigation strategies and operational management plans to mitigate shipping safety and any traffic impacts of the project.

### **Noise and vibration**

Dredging activities and wharf construction works, including piling, could generate noise at sensitive receptors. The proponent has committed to preparing a construction noise and vibration management plan for specific project areas, which would include the mitigation measures outlined in the EIS documentation. The proponent has also committed to limiting piling activities and BHD to standard construction hours, where appropriate.

I have stated conditions for the EA setting noise limits and requirements for noise monitoring to ensure that noise associated with dredging is managed to avoid nuisance at sensitive receptors (residential apartments).

### **Air quality and greenhouse gas emissions**

The EIS documentation stated that construction of port upgrades would be undertaken during construction hours (6.30am and 6.30pm), Monday to Saturday and would take an estimated seven to eight months intermittently over a year. The air quality assessment concluded that potential impacts of unmitigated dredging activities and port upgrade activities may result in elevated levels of particulates and nitrogen oxides.

I note that the elevated levels are worst-case predictions, with impacts likely to be less than predicted. To ensure no adverse impacts occur on sensitive receptors, the proponent would implement monitoring and corrective actions described in the CEMP.

In addition, I note that the International Maritime Organisation (IMO) seeks to control air quality impacts associated with shipping. From 1 January 2020, the IMO mandates that ships must use low sulphur fuel (0.5 per cent). The proponent has committed to liaising with cruise ship companies, the Australian Maritime Safety Authority and DES to achieve the standards set out by the IMO. In addition to the above, the proponent has committed to conduct long-term monitoring of air quality.

I am satisfied that potential air quality impacts resulting from the project's construction and operation can be managed for the life of the project.



## **Delivery of dredge material**

The soft clay dredge material (900 000 m<sup>3</sup>) would be transported via the delivery pipeline to the Northern Sands DMPA. The stiff clay dredge material (100 000 m<sup>3</sup>) would be delivered to Tingira Street DMPA via barges, heavy vehicles and excavators.

### **Matters of state environmental significance**

MSES potentially affected by delivery of dredge material include the Yorkeys Creek FHA, marine plants, protected wildlife, and regulated vegetation. Construction of the delivery pipeline is likely to result in temporary disturbance of Yorkeys Creek FHA, mangroves, melaleuca wetland, ant plant and Beach stone-curlew habitat, and 'of concern' regional ecosystems associated with Richters Creek.

I note the proponent has committed to refine the delivery pipeline alignment to avoid any impacts on MSES. I expect the proponent to undertake further ecological surveys to confirm the disturbance footprint of the delivery pipeline. I also note the proponent has committed to avoid impacts to the Beach stone-curlew by constructing the delivery pipeline outside of the species' breeding season (September to February).

Constructing the delivery pipeline may require offsets for marine plants, particularly mangroves and melaleuca wetland, ant plant habitat and Beach stone-curlew habitat. However, due to the limited disturbance required and temporary nature of the activity, I consider the potential impacts to MSES to be manageable. Any offset requirements for significant residual impacts to matters which are also MNES will be considered by the DEE.

### **Marine water quality and coastal processes**

Water quality may be affected by spillage of dredge material and failure of the delivery pipeline. The proponent has proposed mitigation measures in the DMP to address potential impacts to water quality during dredge material delivery to each DMPA.

Further, the EIS documentation reported no permanent or long-term adverse impacts on coastal processes from the delivery pipeline placement or operation.

I am satisfied that the proponent has adequately assessed potential impacts on water quality and coastal processes that could occur as a result of delivering dredge material. To ensure impacts on water quality and coastal processes are adequately managed and mitigated, I have stated conditions for the EA covering the delivery of dredge material and development approval for the Northern Sands DMPA.

### **Noise and vibration**

Constructing the delivery pipeline and operating the offshore pump-out facility and the booster pump stations would generate noise above the regulatory noise targets at nearby sensitive receptors.

Despite the potential impacts, the assessment noted that as the delivery pipeline, pump-out facility and booster pumps would be in place for a short period of time (12 weeks), sensitive receptors (residential dwellings) would not be subjected to long-term noise impacts.



I am satisfied with the proponent's commitment to prepare a construction noise and vibration management plan for specific project areas to avoid environmental nuisance at sensitive receptors. To achieve this outcome, I have stated conditions setting noise limits and requirements for noise monitoring to ensure that environmental nuisance at sensitive receptors.

### **Traffic and transport**

Maritime vessel safety and local and state-controlled roads could be affected by activities involved in the delivery of dredge material to the DMPAs.

Maritime vessel safety could be affected when transferring dredge material to Tingira Street DMPA. Construction and operation of the delivery pipeline and offshore pump-out facility could also affect maritime vessel safety. To ensure that maritime safety is maintained, I have stated a condition requiring the proponent to prepare and implement a vessel transport management plan.

Hauling delivery pipeline segments to laydown areas along the delivery pipeline corridor could affect local and state-controlled road networks. To ensure that the safety of local and state-controlled road networks is maintained, I have recommended a condition requiring the proponent to finalise and implement a traffic management plan and a heavy vehicle haulage management plan in accordance with the Department of Transport and Main Roads requirements.

### **Onshore placement of dredge material**

#### **Northern Sands DMPA**

The Northern Sands DMPA is located approximately 7.5 km from the mouth of Richters Creek and includes a 34.6 ha void created by sand mining operations.

An approximately 4 km long earth bund would be constructed around the perimeter of the void. The earth bund would provide temporary additional storage capacity above the void, assist in controlling water quality of tailwater and protect against remobilisation of dredge material in the event of Barron River floods.

It is predicted that the earth bund would remain in place over one wet season to allow for sufficient time for settlement of the dredge material. Once sufficient settlement of dredge material occurs, the earth bund would be decommissioned and removed.

A temporary tailwater pipeline would be constructed from the Northern Sands DMPA to the Barron River. The pipeline would run along the Captain Cook Highway road reserve and discharge tailwater at an outfall under the Captain Cook Highway bridge. Following completion of the placement activities, the tailwater pipeline would be decommissioned and removed.

#### *Groundwater*

Placement of dredge material and dredge associated sea water within the Northern Sands DMPA could increase groundwater salt concentrations. This could affect current and future users of groundwater and environmental values including sugar cane, mangroves and samphires. Seepage of saline groundwater may also occur, potentially

impacting the Barron River water quality. I note that impacts on groundwater were modelled and would be worst-case, without mitigation measures. With mitigation measures implemented, the actual potential impacts are likely to be less than predicted.

The proponent has committed to minimise pressure on groundwater within the sand mining void, intercept affected groundwater by sheet piling or dewatering; and entering into make-good agreements with affected land owners. I have stated conditions for the EA requiring the proponent to ensure that the project has no adverse impacts on groundwater. I require the proponent to develop and submit a Groundwater Monitoring Program to DES for their review and approval. I am satisfied that the stated conditions and proponent commitments to manage and monitor groundwater would ensure that the placement of dredge material at the Northern Sands DMPA would not result in impacts on groundwater.

### *Flooding*

The EIS predicted a flood level increase by up to 140 mm for 100-year annual recurrence interval (ARI) flood events at agricultural land situated to the north and east of the Northern Sands DMPA. The agricultural land is already subject to flooding and the assessment identified that the project would not result in over-floor flooding at any residential places during a 100-year annual recurrence interval flood event.

The assessment identified that positive benefits would occur, with over 100 residential properties located to the east of the Northern Sands DMPA within the Holloways Beach township experiencing a decrease in flood levels by 10 to 40 mm, because the void would change the flood path.

I have stated a condition requiring the proponent to ensure that the bund has a no-worsening impact on flooding for external properties. I note the proponent is required to prepare a Flood Risk Assessment (FRA) of the proposed works and submit it to the Cairns Regional Council (CRC) for their review and approval prior to commencement of bund wall construction.

### *Structural integrity*

The proponent has assessed the potential for seepage, remobilisation of dredge material, flood overtopping and rainfall overtopping and bund wall integrity impacts. The EIS documentation reported that the risk of bund wall failure is low.

The EIS documentation predicted that the 5.5 m (Australian Height Datum (AHD)) bund (approximately 2 m above ground level) would protect the placed material against storm tide impacts for the 100-year ARI storm surge level of 1.99 m AHD. The bund wall would also provide protection for the worst-case scenario and the unlikely 1000-year ARI storm surge level of 3.02 m AHD. The assessment noted that there is very low likelihood of cyclonic weather events during the placement of soft clay dredge material at Northern Sands DMPA, as the placement of material would occur during the dry season.

I am satisfied that the design height would ensure the structural integrity of the bund wall. I have stated conditions as part of the EA to set standards for the bund wall,

including a requirement to maintain a freeboard of 600 mm. This would ensure the Northern Sands DMPA has sufficient capacity for rainfall events. Further, where the bund is assessed to be a regulated structure, additional design requirements have been set to manage potential impacts.

#### *Acid sulfate soils*

The EIS documentation reported that approximately 320 000 m<sup>3</sup> of Potential Acid Sulfate Soils (PASS) and 580 000 m<sup>3</sup> of self-neutralising material could be present within the soft clay dredge material. If PASS is exposed to air during placement, oxidation of material could occur which could lead to impacts on surface water and groundwater environmental values at the Northern Sands site and the surrounding environment.

To manage the risk of PASS oxidation, the proponent would ensure that material remains saturated at all times during dredging, delivery and placement at Northern Sands DMPA. The proponent would ensure any PASS material is placed 1.0 m below the groundwater level to prevent potential oxidation.

Material placed above the lowest groundwater table would be subject to a sampling and analysis program to ensure any PASS material is treated in line with the Queensland Acid Sulfate Soil Technical Manual: Soil management guidelines (2014) (the guidelines). To ensure this outcome, I have required that PASS material (placed above 1 m below the lowest permanent groundwater table) be treated in accordance with the guidelines. Further I have also required an Acid Sulfate Soils Management Plan to be submitted to DES for their review and approval prior to dredge material placement.

#### *Surface water quality (tailwater discharge and drainage)*

The potential water quality impacts associated with tailwater discharge include changes to turbidity and salinity of the Barron River. The zone of influence predicted for turbidity impacts associated with tailwater releases extends from the discharge point up the Barron River to alongside the DMPA, and downstream to near the Barron River mouth. There are no zones of low to moderate impact, or zones of high impact predicted. The zone of influence is not predicted to extend into Thomatis/Richters Creek.

Discharge of tailwater from the Northern Sands DMPA is predicted to result in a minor increase in salinity of the Barron River. The extent of increase is considered relatively minor in the upper reaches of the Barron River and negligible in the lower reaches of the Barron River, as the ambient salinity is higher in this area due to the tidal influence.

The EIS assessment concluded that potential impacts on water quality due to tailwater discharge from the Northern Sands DMPA is expected to be short-term and minor. There are no predicted impacts on marine water quality as a result of tailwater discharge from Northern Sands DMPA due to distance of the DMPA to the mouth of the Barron River.

To ensure potential water quality impacts are managed, I have stated conditions for inclusion in the EA. These conditions set limits for water quality parameters to control tailwater release and require the proponent to finalise the DMP, including a Tailwater

Management Reactive Monitoring Program (RMP). The RMP includes a monitoring program for the release of tailwater from the Northern Sands DMPA. This monitoring program would be overseen by the TAG.

#### *Matters of state environmental significance*

I am satisfied that the dredge material placed at the Northern Sands DMPA will not result in significant residual impacts to MSES. The potential habitat at the Northern Sands DMPA is not considered to be an ecologically significant location for MSES. I am satisfied that the proponent has adequately assessed project impacts on MSES and that the proposed commitments and mitigation measures are appropriate to manage impacts on MSES.

#### *Noise*

The noise impact assessment identified that activities associated with the placement of dredge material at the Northern Sands DMPA would be compliant with the noise targets for the temporary construction activities. I note that the noise impact assessment was based on a preliminary location of the tailwater discharge pump and I expect the proponent to undertake further noise assessment once the final location of the Northern Sands DMPA tailwater discharge pump is confirmed. To ensure that sensitive receptors (rural residential dwellings) are not adversely affected by noise emissions from activities associated with placement of dredge material at the Northern Sands DMPA, I have stated a condition requiring the proponent to conduct noise monitoring and comply with relevant noise limits.

#### *Air quality*

The air quality assessment identified that operation of the tailwater pumps could result in exceedances of nitrogen dioxide levels. To manage this impact, the proponent has proposed to install exhaust stacks and emission control technology. The concentrations of all other pollutants at the Northern Sands DMPA are predicted to be low. To ensure that sensitive receptors are not adversely affected, I have stated conditions for the EA for the Northern Sands DMPA requiring the proponent to comply with limits for dust and particulate matter.

#### *Traffic*

Traffic assessment undertaken by the proponent identified that activities associated with placement of dredge material at the Northern Sands DMPA are unlikely to result in adverse impacts on the local and state-controlled road network. I expect the proponent to consult with the Department of Transport and Main Roads (DTMR), CRC and the Queensland Police Service regarding road haulage routes and escort requirements prior to commencing construction. To ensure impacts are appropriately managed, I have recommended a condition requiring the proponent to submit a Heavy Vehicle Haulage Management Plan and a Traffic Management Plan to DTMR and CRC for any works including vehicular access on the state-controlled road corridors to facilitate safe access and egress of heavy vehicles.

## **Tingira Street DMPA**

The proponent proposes to place stiff clay dredge material (100 000 m<sup>3</sup>) at the Tingira Street DMPA. Tingira Street DMPA is previously reclaimed port land, located at Tingira Street, Portsmith. Dredge material would be placed at two placement areas, at the southern and northern extent of the DMPA. Each placement area would be serviced by a barge ramp facility.

I note that placement of stiff clay dredge material over previously reclaimed land represents a beneficial reuse of dredge material that improves the suitability of the area for future port activities. Any future development at the Tingira Street DMPA would be subject to separate approval processes and is not part of my evaluation.

### *Matters of state environmental significance*

Placement of dredge material at the Tingira Street DMPA has the potential to impact on protected wildlife, marine plants and the Trinity Inlet declared fish habitat area (FHA). Potential habitat for the Beach stone-curlew would be permanently lost due to dredge placement. However, as the site has been previously reclaimed, it is significantly disturbed and provides low potential critical habitat for the Beach stone-curlew. The EIS documentation identified a loss of potential habitat for the Beach stone-curlew as a result of removal of 0.76 ha of tidally influenced vegetation and mangroves. Mangroves located on the south and south-western boundary of the Tingira Street DMPA form part of the Trinity Inlet declared FHA and could also be affected. Clearing marine plants at this location is approved under an existing approval held by the proponent.

To ensure potential impacts on the Beach stone-curlew are managed, I have stated a condition requiring the proponent to place dredge material at the Tingira Street DMPA outside of the Beach stone-curlew's breeding season (September to February).

I am satisfied that the potential impacts on MSES as a result of construction activities associated with the onshore placement of dredge material at the Northern Sands DMPA would be managed appropriately through the proposed mitigation measures, proponent commitments and stated conditions.

### *Acid sulfate soils*

The EIS documentation reported that stiff clay dredge material could contain small amounts of PASS. To manage the risk of PASS oxidising, the proponent would sample and analyse the material to ensure any PASS material is treated in line with the guidelines. To ensure PASS is managed, I have stated a condition requiring the proponent to prepare an Acid Sulfate Soils Management Plan in accordance with the guidelines. The proponent will submit the Acid Sulfate Soils Management Plan to DES for their review and approval prior to dredge material placement.

### *Noise*

The EIS documentation identified that activities associated with placement of dredge material at the Tingira Street DMPA would not generate noise above the regulatory limits for temporary construction activities. The proponent has committed to preparing and implementing a construction noise and vibration management plan for the Tingira

Street DMPA. I have stated conditions, including noise limits and requirements for noise monitoring, to ensure that noise associated with the placement of dredge material at the Tingira Street DMPA is managed to avoid nuisance at sensitive receptors (educational facilities).

#### *Air quality*

Air quality assessment identified that no levels above the Environmental Protection Policy (Air) 2008 limits would occur during site preparation and placement of stiff clay dredge material at the Tingira Street DMPA. To ensure dust generation is managed, the proponent has committed to use high pressure water sprays during truck loading (if required). To ensure that no adverse air quality impacts are caused, I have stated a condition requiring the proponent to avoid environmental nuisance at sensitive receptors.

#### *Traffic and transport*

The EIS documentation identified that the usage of the road network is expected to result in a minor increase in traffic and is unlikely to be an adverse impact to the local and state-controlled network. Safe access to the Tingira Street DMPA can be adequately provided to allow the transportation of heavy vehicles and daily movements of staff and service vehicles.

I have recommended a condition for the proponent to prepare a heavy vehicle management plan for any heavy vehicles for all phases of the project and to consult with DTMR, CRC and the Queensland Police Service prior to commencing construction. I note the proponent will confirm haulage vehicle routes, timings and escort requirements on the local and state road networks through the preparation of a Traffic Management Plan (TMP). I have required the proponent to submit the TMP to DTMR and CRC for any works including vehicular access within local and state-controlled roads to facilitate safe access, and egress of heavy vehicles under state-controlled road corridors.

#### **Land use and planning**

The proposed port upgrades are consistent with the Ports North Land Use Plan and the CairnsPlan 2016. I consider the potential land use impacts (flooding) associated with the Northern Sands DMPA to be low risk due to the temporary nature of dredging and construction activities and that they can be managed effectively. To ensure potential land use impacts are managed, I have stated conditions for the material change of use approval for the Northern Sands DMPA.

I have stated conditions for the relevant planning approvals to ensure that the state's interest in development assessment is maintained and protected.

I expect that any potential land use impacts would be further reduced through planning and project refinements during detailed design and implementation of the proponent commitments and mitigation measures proposed in the EIS documentation.

I am satisfied that the project will facilitate development that will maintain its compatibility with the adjoining Cairns CBD.



## Social impacts

I am satisfied that the potential social impacts which may occur as a result of the project have been adequately assessed, and that sufficient stakeholder engagement has been undertaken to inform the EIS documentation. The proponent's social impact assessment considered a range of issues including community and stakeholder engagement, workforce management, housing and accommodation, local business and industry content, and health and community wellbeing. A number of actions and opportunities have been identified in the EIS documentation to manage social impacts.

The employment opportunities provided by the project (both direct and indirect) will be a significant benefit to the region. Due to the use of a primarily local workforce, it is unlikely that housing affordability and availability will be significantly impacted.

The project will provide opportunities for local industry participation during construction, for example in the supply of contractor personnel, construction materials and machinery/equipment. Once operational, there will be extensive opportunities for local businesses, particularly those in the tourism and hospitality sector, to benefit from the increased shore visits by both passengers and crew.

The proponent has committed to implementing appropriate mitigation and management strategies for the potential temporary health and community wellbeing impacts during construction, including those associated with air and noise emissions, road safety, access restrictions and possible water quality degradation.

I have imposed two social conditions to ensure social impacts are managed adequately. The first condition requires the proponent to prepare, to my satisfaction, a community and stakeholder engagement plan to guide engagement activities throughout the construction phase of the project. This condition also requires the update of impact mitigation and management strategies in response to stakeholder feedback. I have also imposed a condition requiring the proponent to submit an annual social impact management report for a period of three years, starting from the commencement of construction.

I am satisfied that the commitments made by the proponent and the conditions I have imposed on the project will ensure negative social impacts are effectively managed and will deliver social benefits to the local community, particularly through increased employment and business opportunities.

## Economic impacts

I am satisfied that the project would provide significant economic opportunities including local employment opportunities within the Cairns region.

The project is expected to contribute \$848.6 million total value to the Cairns economy from increased expenditure and as a result of increased cruise, naval and large cargo ship activities from project commencement to 2043.

The port upgrades would address the increasing trend towards larger cruise ships unable to access the Port of Cairns. As a result, the project would also prevent the loss of cruise ship home porting, which occurs when a ship changes over the majority of its

passengers while taking on stores, supplies and fuel. Home porting is predicted to be worth \$492.2 million from project commencement to 2043.

The project is also expected to create 195 direct FTE construction jobs over the construction period and support 1535 direct FTE operational jobs per annum.

### **Coordinator-General's conclusion**

I consider that the environmental impact assessment requirements of the SDPWO Act for the Cairns Shipping Development Project have been met and that sufficient information has been provided to enable a thorough evaluation of the potential impacts of the project.

I conclude that there are significant local and regional benefits to be derived from the project, and that any adverse environmental impacts can be adequately avoided, minimised, mitigated and/or offset as required through the implementation of the measures and proponent commitments outline in the EIS documentation. The conditions I have specified in this report have been formulated to further manage all potential impacts associated with the project.

I note that the Commonwealth matters of the project are being assessed separately by the Commonwealth DEE under the *Environment Protection and Biodiversity Conservation Act 1999*.

Accordingly, I recommend that the project proceed, subject to conditions and recommendations included in this report. In addition, I expect that the proponent's commitments will be fully implemented.

In accordance with section 35A of the SDPWO Act, this report will lapse on 28 February 2022.

A copy of this report will be provided to the proponent and relevant state government agencies, and will also be made publicly available at

[www.statedevelopment.qld.gov.au/cairnssdp](http://www.statedevelopment.qld.gov.au/cairnssdp)



Barry Broe  
Coordinator-General

27 February 2018



# 1. Introduction

This report provides an evaluation of the environmental impact statement (EIS) for the Cairns Shipping Development Project (the project). This report has been prepared pursuant to section 34D of the *State Development and Public Works Organisation Act 1971* (SDPWO Act).

This report does not cover all the matters that were identified and subsequently addressed during the assessment. Rather, it concentrates on the most critical and substantive issues identified during the EIS process and the measures and conditions required to address the impacts. This report:

- summarises the key issues associated with the potential impacts of the project on the natural, physical, social and economic environments at the local, regional and state levels
- presents an evaluation of the project, based on information contained in the EIS documentation (including draft EIS and revised draft EIS [RDEIS]), supplementary information provided by the proponent, submissions made on the EIS documentation during public consultation periods and advice from advisory agencies
- states and imposes conditions and makes recommendations under which the project may proceed
- documents the proponent's commitments.

## 2. About the project

### 2.1 The proponent

Far North Queensland Ports Corporation Limited ACN: 131836014, trading as Ports North, is the proponent for the project. Ports North is a government-owned corporation under the *Government Owned Corporations Act 1993*, and is declared a port authority under the *Transport Infrastructure Act 1994* (TI Act). Under the TI Act, Ports North is responsible for operating the Port of Cairns and other North Queensland trading ports including Burketown, Cape Flattery, Cooktown, Karumba, Mourilyan, Port Kennedy, Quintell Beach, Skardon River and Thursday Island.

### 2.2 Location

The Port of Cairns is located on the western bank of Trinity Inlet, approximately 1 km south-east of the city centre of Cairns in northern Queensland (Figure 2.1). Access to the port is via the existing Trinity Inlet shipping channel (the shipping channel), which extends into Trinity Bay, forming part of the Coral Sea.

The project involves capital dredging up to 1 000 000 m<sup>3</sup> of sediment material within the shipping channel and two swing basins. The dredge material would be placed onshore at two dredge material placement areas (DMPAs).

A total of 900 000 m<sup>3</sup> of soft clays would be delivered to the proposed Northern Sands DMPA, which would be located approximately 6 km south of Yorkeys Knob on the Captain Cook Highway (Figure 2.1). The soft clays would be pumped via a 7.5-kilometre-long temporary dredge delivery pipeline (the delivery pipeline) to the Northern Sands DMPA. A temporary dredge mooring and pump-out facility (the pump-out facility) would be established between 2.7 and 3.7 km offshore from Yorkeys Knob to facilitate pumping of the soft clays (Figure 2.1).

The remaining 100 000 m<sup>3</sup> of stiff clay would be delivered to the Tingira Street DMPA, located approximately 3 km south of the Cairns wharf precinct (Figure 2.1). Two barge ramps would be utilised to receive the stiff clays, located on the northern and southern perimeter of the Tingira Street DMPA (Figure 2.5).

Three material laydown areas approximately 0.5 ha in size would be used for the project. The laydown areas would be established in existing cleared/grassland areas, with two proposed to be established along Richters Creek (one at Richters Creek mouth and one further inland) and one adjacent to the Northern Sands DMPA.

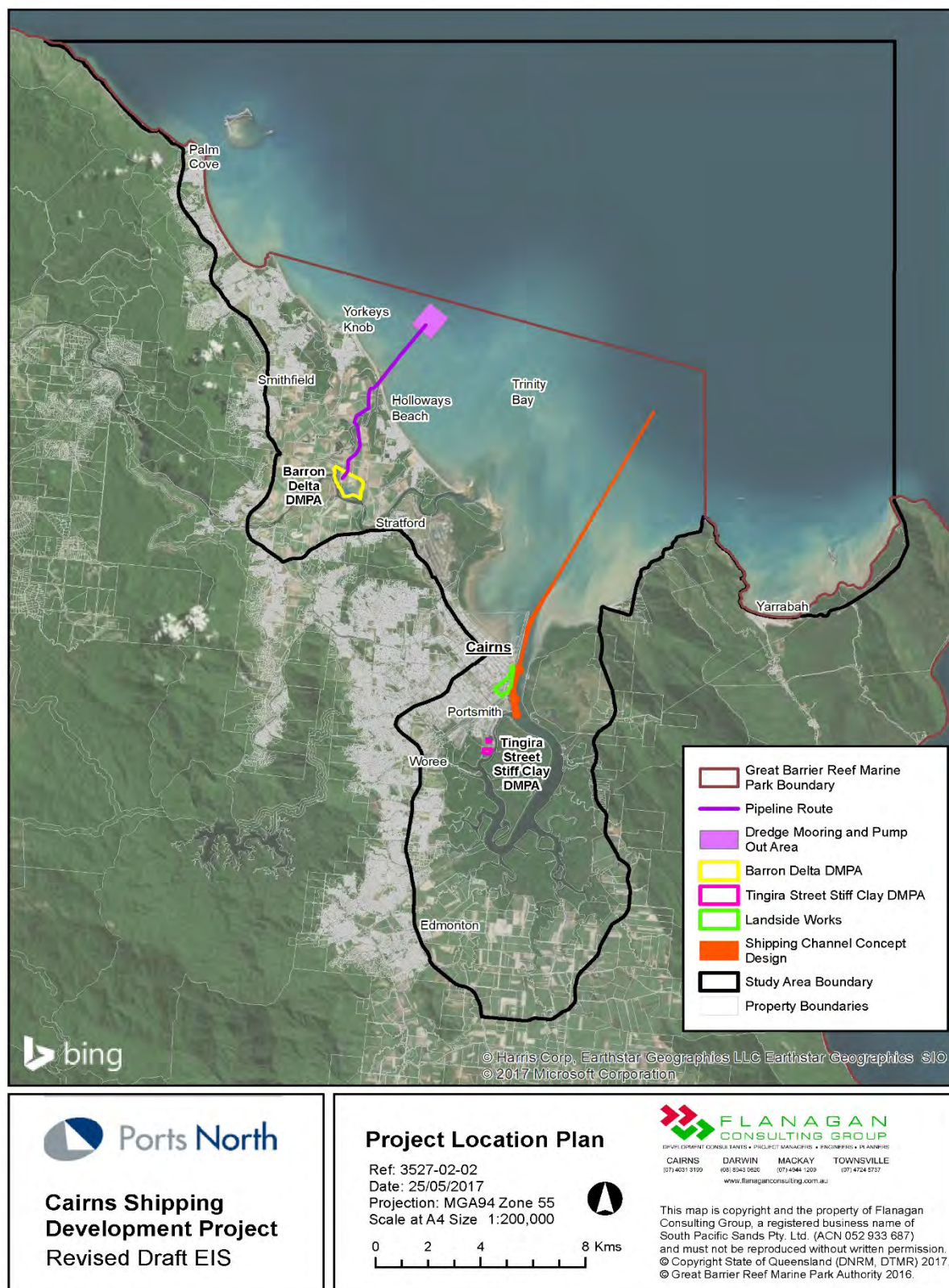


Figure 2.1 Project location

## 2.3 Project description

### 2.3.1 Project components

The project consists of three key components which are considered in my evaluation:

- (1) capital dredging and port upgrades
- (2) delivery of dredge material
- (3) onshore placement of dredge material.

These are described in the below sections.

#### Capital dredging and port upgrades

##### Capital dredging

The proponent proposes to undertake capital dredging of up to 1 000 000 m<sup>3</sup> of sediment material to primarily enable access for larger cruise ships (up to 300 m in length) and to also expand berthing capacity for Her Majesty's Australian Ship (HMAS) Cairns Navy.

The capital dredging includes widening and deepening of the shipping channel and deepening of the existing Crystal swing basin, establishment of a new Smiths Creek swing basin and expansion of berth pockets. Table 2.1 and Figure 2.2 detail proposed dredging depths and widths.

Due to the current location of the existing Main swing basin, future opportunity for HMAS Cairns Navy expansion is restricted. The project would create a new Smiths Creek swing basin upstream of the Main swing basin to expand berthing capacity for the navy.

Capital dredging is proposed to be undertaken with two types of dredge: Trailer Suction Hopper Dredge (TSHD) and Back Hoe Dredge (BHD). The TSHD would be used to remove 900 000 m<sup>3</sup> of soft clays, while the BHD would remove the remaining 100 000 m<sup>3</sup> of stiff clays. For shallow channel widening activities, the proponent proposes to use a bed levelling tug to move the material from the shallow channel into the deeper channel waters for the TSHD to collect.

**Table 2.1 Proposed dredging depths and widths (Source: RDEIS Chapter A3)**

Dredging area	Dredging to widen	Dredging to deepen
Outer shipping channel	Widening by 10 m, from existing 90 m width to 100 m width	Deepening from existing design declared depth of –8.3 m to –8.8 m LAT
Inner shipping channel	Widening by 20 m, from existing 90 m width to 110 m width	Deepening from existing design declared depth of –8.3 m to –8.8 m LAT

Dredging area	Dredging to widen	Dredging to deepen
Shipping channel bend	Widening by 30–60 m, from existing 120–150 m to 180 m width	Deepening from existing design declared depth of –8.3 m to –9.1 m LAT
Crystal swing basin	No widening of 380 m width	Deepening from existing minimum design depth of –6.3 m to –8.8 m LAT
New Smiths Creek swing basin	Widening to 310 m width	Deepening to –8.3 m LAT design declared depth
Berth pockets	Widening to 50 m width	Deepening to –9.3 m LAT design declared depth

Annual maintenance dredging is required to ensure the shipping channel remains at the required depths for safe navigation of ships. The project would increase the volume of annual maintenance dredging by an estimated two to six per cent. The proponent currently places maintenance dredge material at the existing Cairns Port DMPA. Disposal of the maintenance sediment material is permitted under the *Sustainable Ports Development Act 2015* and the proponent holds a current Sea Dumping Permit under the *Environment Protection (Sea Dumping) Act 1981* (Cwlth).

The disposal of an increased volume of maintenance dredge material at the existing Cairns Port DMPA is not part of the project. The proponent has indicated that the increase in maintenance dredging would be accommodated as part of the existing maintenance dredging approval held by the proponent. Accordingly, my evaluation does not include an assessment of the potential environmental impacts associated with such an activity.

The current shipping channel in Cairns is within a 200 m wide exclusion area from the Trinity Inlet declared FHA. The exclusion area was put in place at the time of declaration of the FHA in 1998 to cater for possible future expansions of the channel.

The proposed shipping channel footprint is not completely within the exclusion area. Approximately 9.21 ha of the proposed channel is in the Trinity Inlet declared FHA. The proposed dredging activities cannot commence unless the FHA boundaries are amended.



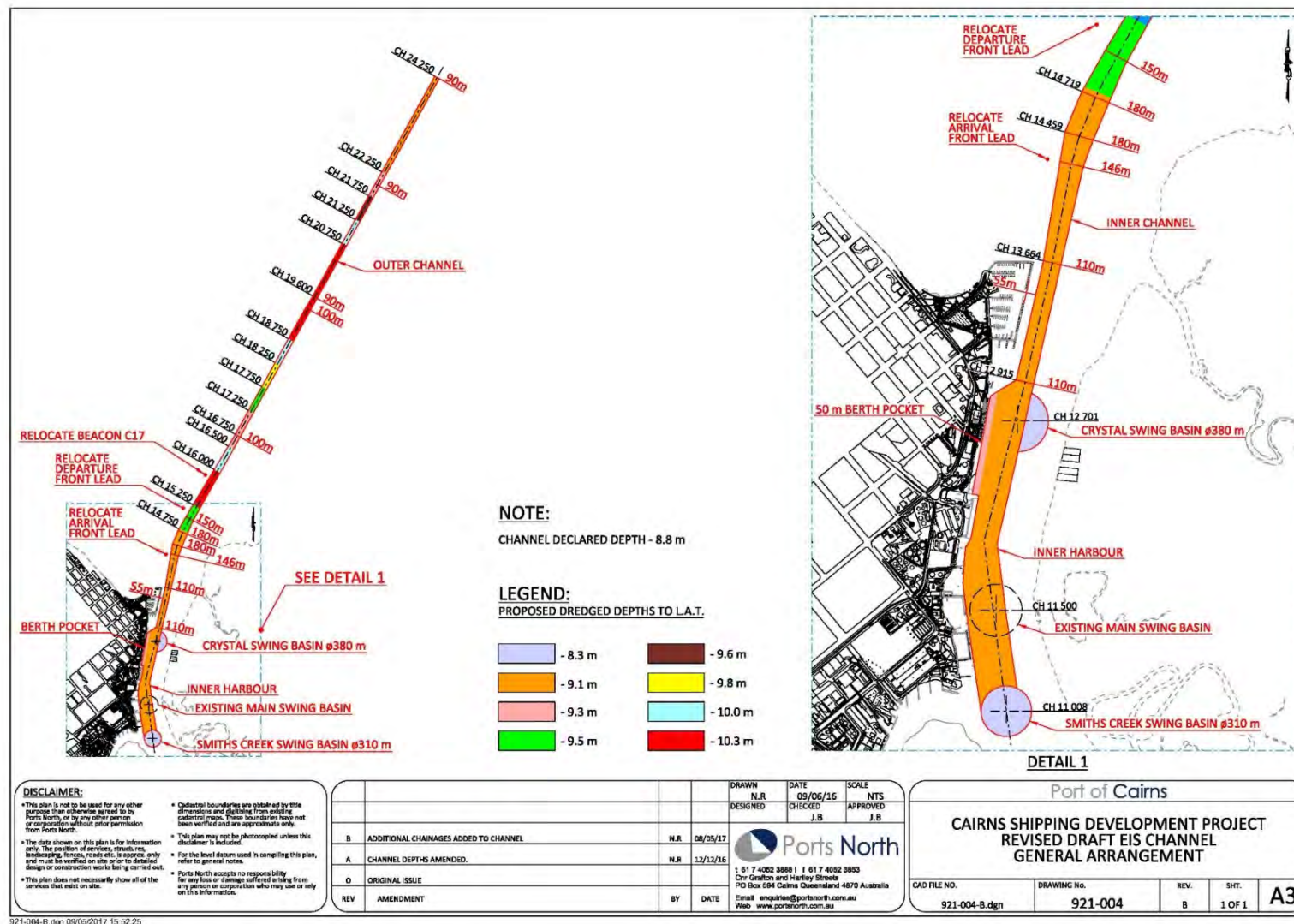


Figure 2.2 Proposed shipping channel and swing basins dredging depths and widths

## Port upgrades

To accommodate increased shipping in the port, the proponent proposes to:

- relocate existing navigational aids and install new navigational aids within the shipping channel
- upgrade the fender system at the existing wharves 1 to 5 to accommodate larger and heavier cruise ships
- install berthing and mooring dolphins at and adjacent to wharves 1 to 5
- demolish a part of wharf 6 to make way for extension to wharf 5
- upgrade key bollards and retain representative historic elements at wharf 6
- upgrade ship services to the wharves, including an Intermediate Fuel Oil (IFO) pipeline, potable water and fire-fighting services.

## Delivery of dredge material

The TSHD is proposed to transport soft clays from the shipping channel and swing basin to a pump-out facility, proposed to be located between 2.7 km and 3.7 km offshore from Yorkeys Knob (Figure 2.3). The proponent has indicated that the pump-out facility is required to be located between 2.7 and 3.7 km offshore, to ensure it is within sufficiently deep water and to minimise impacts to surrounding sensitive receptors and environmental values. The pump-out facility may be located further than 3.7 km to ensure sufficient draft is available for the TSHD and this will be confirmed during detailed design stage of the project. The pump-out facility would be fixed to the seabed, providing mooring for the TSHD and a launching point for the delivery pipeline.

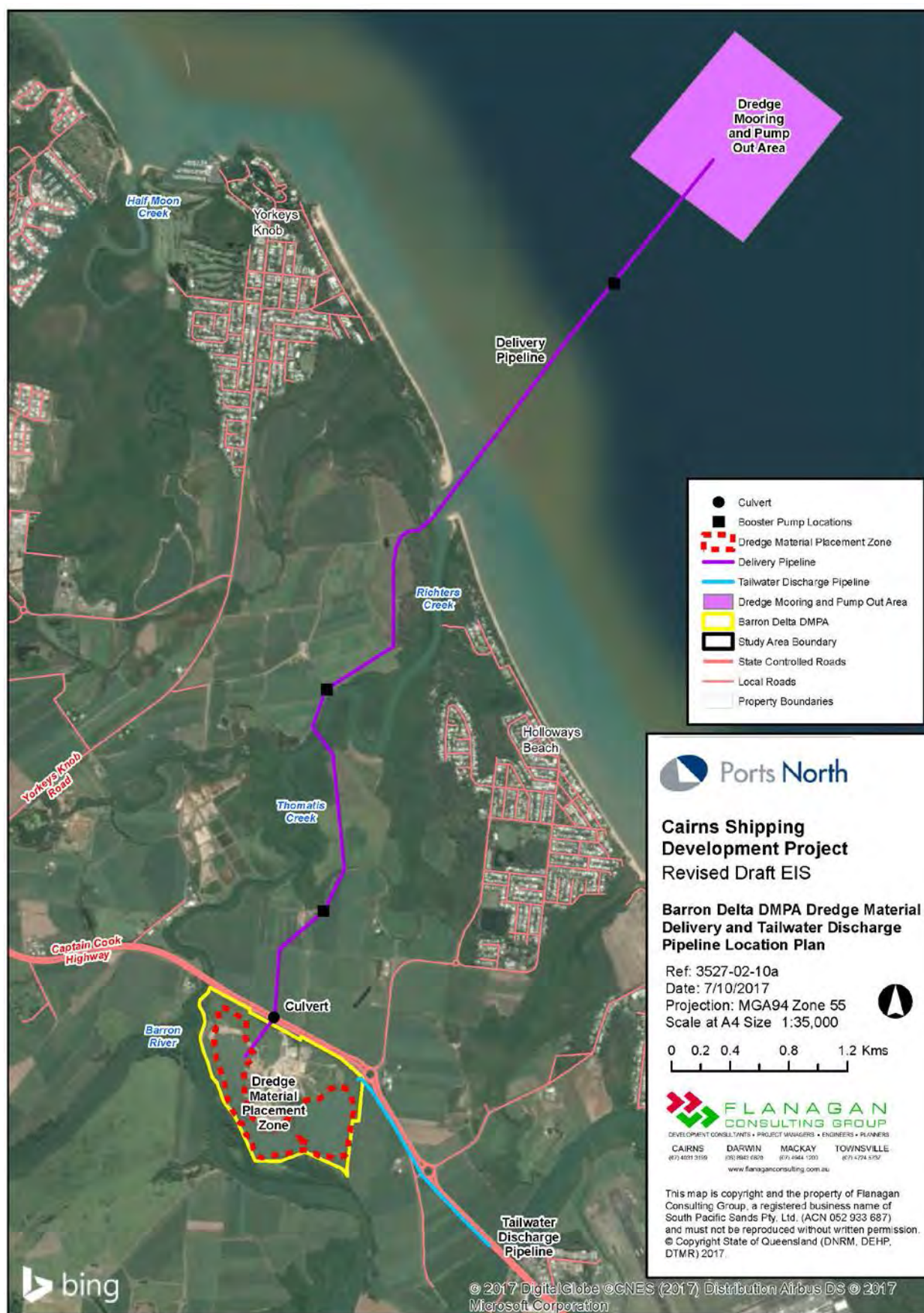
The delivery pipeline would be submerged underwater, until it makes landfall at the mouth of Richters Creek. The delivery pipeline would then cross Richters Creek and cane farms and pass through a culvert on the Captain Cook Highway before terminating at the Northern Sands DMPA.

Three booster pump stations may be required to pump dredge material to the Northern Sands DMPA (Figure 2.3). One booster pump station is anticipated to be located offshore, while the other two may be on land.

A BHD would be used to dredge stiff clays within the channel and swing basins, then load dredged stiff clays into a barge. A tug boat would then tow the hopper barge to the Tingira Street DMPA where a barge-mounted excavator would transfer material to off-road haulage vehicles. The dredge material would then be unloaded at Tingira Street DMPA.

During the detailed design stage of the project, the proponent would finalise the:

- location of the delivery pipeline
- size and location of the pump-out facility including the type of moorings
- number and location of booster pump stations.



**Figure 2.3 Dredge mooring and pump-out facility and delivery pipeline**



## Onshore placement of dredge material

The capital dredge material is proposed to be placed onshore at two DMPAs, the Northern Sands and Tingira Street DMPAs.

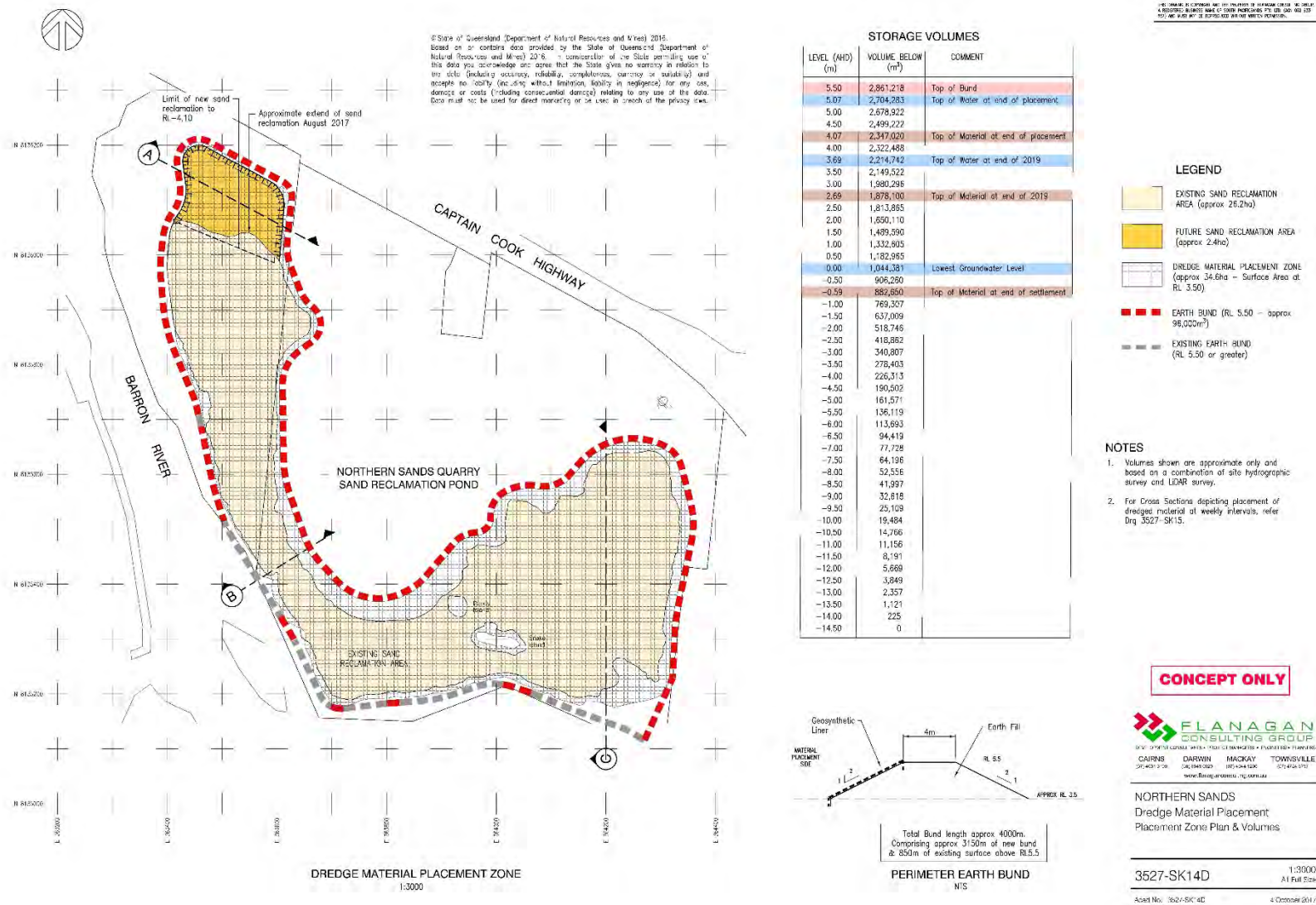
### Northern Sands DMPA

The proposed Northern Sands DMPA is a 34.6 ha void that is being progressively quarried. The Northern Sands DMPA is located within the existing 83.8 ha Northern Sands site. The site consists of Lot 2 on RP712954, Lot 5 on SP245573 and Lot 6 on SP254473 (Figure 2.3 and Figure 2.4) which contains an operating sand quarry and waste disposal facility operated by Northern Sands Pty Ltd.

Sugar cane farming is undertaken in the land surrounding the Northern Sands site. A total of 900 000 m<sup>3</sup> of soft clay is proposed to be delivered as a slurry through the delivery pipeline with diffuser and spreader devices attached to the delivery pipeline discharge point, to assist in spreading the material and enhance settlement rates. A tailwater discharge pipeline (the discharge pipeline) will run from the Northern Sands DMPA adjacent to the Captain Cook Highway and discharge tailwater into the Barron River at the bridge crossing.

### Tingira Street DMPA

The Tingira Street DMPA has a southern and northern site, consisting of up to 5.6 ha on Lot 27 on SP218291 (Figure 2.5). Tingira Street DMPA is located on strategic port land with two barge ramps to be used to deliver the dredge material. The northern ramp is existing and the southern ramp is approved and to be constructed. The remaining 100 000 m<sup>3</sup> of stiff clay is proposed to be beneficially re-used to improve the stability of the site for future port development.







## **Future use and development of DMPAs**

The future use and development of the Northern Sands DMPA and Tingira Street DMPA does not form part of the declared project. My evaluation focuses on the assessment of project impacts associated with the construction and preparation of the Northern Sands DMPA, Tingira Street DMPA and wharves 1–6.

The impacts associated with the future use and development of Northern Sands DMPA and Tingira Street DMPA are the responsibility of the relevant tenants and operators under the Port of Cairns Land Use Plan 2013 and CairnsPlan 2016. Future developments would be subject to further approvals from Ports North and Cairns Regional Council as the relevant assessment managers.

## **2.3.2 Project development stages**

This project would be completed over three stages: pre-construction, construction and decommissioning. Activities associated with each stage are described in the following sections.

### **Pre-construction**

The stage of the project includes the following activities:

- obtaining all necessary approvals prior to construction commencement
- removal of vegetation from project sites
- establishing the pump-out facility
- establishing the delivery pipeline from the pump-out facility to the Northern Sands DMPA
- establishing material laydown areas adjacent to the delivery pipeline corridor
- establishing the bund wall around the Northern Sands DMPA (approximately 4.0 km in length)
- installation of a discharge pipeline from the Northern Sands DMPA
- establishing site offices.

The Northern Sands DMPA bund wall would take approximately five months to construct. The EIS documentation states the pre-construction works for the pump-out facility, delivery pipeline and preparation of the Northern Sands DMPA will be undertaken concurrently, during daylight hours (6.30 am to 6.30 pm) for up to six weeks.

### **Construction**

The proponent proposes to undertake capital dredging 24 hours per day, seven days per week for up to 12 weeks during May to September 2019. The capital dredging of soft clay is proposed to be undertaken over a duration of up to 12 weeks; while the capital dredging of stiff clay is proposed to be undertaken concurrently over a duration of up to five weeks.

The EIS documentation states that wharf construction would be undertaken during daylight hours (6.30 am to 6.30 pm), Monday to Saturday over seven to eight months intermittently over a year. Upgrades to existing water mains and firefighting equipment would be undertaken concurrently with wharf upgrades. Installation of sewage reception facilities and a fuel storage tank would be subject to market demand. The EIS documentation states that the wharf construction for the upgrading of wharves 1 to 6 would begin prior to dredging, to ensure that completion of wharf construction work coincides with the end of the capital dredging program, anticipated to occur in September 2019.

Some existing navigational aids would be relocated and new navigational aids anchored to differentiate the new shipping channel, the existing Crystal swing basin and new Smiths Creek swing basin.

The EIS documentation reports that placement of dredge material at the Northern Sands DMPA and Tingira Street DMPA would be undertaken 24 hours per day, seven days per week for 12 weeks and six weeks respectively. The pump-out facility and delivery pipeline will be in place no longer than six months.

### Decommissioning

The revised EIS states that the decommissioning of the temporary dredge mooring, pump-out facility and delivery pipeline would be undertaken during daylight hours for an estimated four to six weeks, after the placement of dredge material at the Northern Sands DMPA is complete. Subject to the settling characteristics of the dredge material, the discharge pipeline is proposed to be decommissioned in conjunction with the dredge delivery pipeline. At this time, rehabilitation work is proposed to be undertaken on disturbed areas at project sites. The EIS anticipates the bund wall at the Northern Sands DMPA would be removed prior to the wet season in October/November 2020, subject to settlement and consolidation rates.

I note that the timing of the development stages discussed above is subject to obtaining the necessary approvals and funding to undertake the project.

### 2.3.3 Project revision

The draft EIS completed in 2015 proposed to undertake capital dredging of up to 4 400 000 m<sup>3</sup> for the expansion of the existing Trinity Inlet shipping channel and swing basin. The capital dredge material and maintenance dredge material was originally proposed to be placed at sea.

In March 2015, the Queensland and Australian governments released the Reef 2050 Plan. The plan sets out the Queensland and Australian governments' policy to prohibit capital dredging outside of priority ports and to prohibit the disposal of capital dredge material in the Great Barrier Reef Marine Park (GBRMP) and the Great Barrier Reef World Heritage Area.

To implement the policies, amendments were made to the Great Barrier Reef Marine Park Regulations 1983 (Cwlth) (GBRMP Regulations) which commenced on 2 June

2015,<sup>1</sup> and Queensland parliament passed the *Sustainable Ports Development Act 2015* (Ports Act) which commenced on 20 November 2015.

The GBRMP Regulations prohibit dumping of capital dredge material in the GBRMP area.<sup>2</sup> The Ports Act identifies five priority ports and prohibits capital dredging outside of a priority port's master planned area. The Ports Act also prohibits sea-based disposal of dredge material.

The Ports Act includes a transitional provision for projects that are subject to an active EIS process, which would allow the Port of Cairns, which is not identified as a priority port, to carry out capital dredging.<sup>3</sup>

The RDEIS was prepared to address the ban on capital dredging and to be consistent with the Reef 2050 Plan, as well as additional information requirements and comments received during public consultation on the draft EIS.

I note that the volume of material required to be dredged has been reduced from up to 4 400 000 m<sup>3</sup> to up to 1 000 000 m<sup>3</sup> (less than one-quarter of the volume of dredging originally proposed in 2015). The proponent undertook detailed studies including vessel simulations to define dredging depths and optimise vessel numbers.

## 2.4 Project need

The Port of Cairns provides essential transport infrastructure for Far North Queensland which drives significant benefits for the local economy. In 2015–16, the total trade through the Port of Cairns was 1.1 million tonnes, which included the bulk export of petroleum products, sugar, molasses, fertiliser, and liquid petroleum gas.<sup>4</sup>

The Port of Cairns is predominately a transit port, with cruise ships generally visiting for a day or overnight, stopping en route within a longer itinerary. Passengers are generally unable to join or leave the cruise ship at a transit port and there are limited opportunities for ships to take on supplies or undertake maintenance as the stops are of a short duration.

The expansion of cruise ship facilities in Cairns would support the development of increased tourism opportunities in North Queensland and support cruise shipping operations in Queensland.

Cruise shipping is the fastest growing tourism market world-wide, and cruise ship visits to Cairns have been increasing with 34 cruise ship visits in 2010, 43 visits in 2015, 64 visits in 2016 and 80 visits in 2017. However, there is a trend towards a greater proportion of mega cruise ships which are too large to access the Port of Cairns, as the existing shipping channel is not wide or deep enough to allow safe access for large vessels. Therefore, while boutique and mid-class cruise ships can berth at Trinity Wharf, mega cruise ships must anchor offshore near Yorkeys Knob, 15 km from the

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<sup>1</sup> Great Barrier Reef Marine Park Regulations 1983, Compilation No. 49, 2 June 2015.

<sup>2</sup> Great Barrier Reef Marine Park Regulations 1983, Regulation 88RA.

<sup>3</sup> *Sustainable Ports Development Act 2015*, Part 5.

<sup>4</sup> Department of Transport and Main Roads, *Trade Statistics for Queensland Ports*, 2017, 28.

Cairns central business district (CBD). Transferring from cruise ships to Cairns via Yorkeys Knob has a number of disincentives for passengers, including a return transfer time of 3.5 hours and potential cancellation due to weather, which results in fewer passenger days in port and reduced expenditure in Cairns and the surrounding region.

The project would facilitate access to the Port of Cairns for mega cruise ships which would increase the number of passenger days in port and realise greater economic benefits to the Cairns regional economy. The refined channel would provide access to an additional 85 mega class cruise ships by 2031, while dredging less than one-quarter of the dredging volume proposed in the draft EIS. In addition, the EIS documentation reported that the revised project would provide a greater return on investment at a substantially lower capital cost compared with the draft EIS proposal.

With a deeper channel access to the HMAS Cairns Navy base, the project will also enhance the potential for the Royal Australian Navy's (RAN) largest ships (HMAS Canberra, HMAS Adelaide) to berth in Cairns enabling future expansion of defence activities.

### 3. Environmental impact statement assessment process

In undertaking this evaluation, I have considered the following information:

- the initial advice statement
- the EIS documentation and technical reports
- issues raised in submissions on the EIS documentation
- supplementary information provided by the proponent
- advice from the proponent
- advice from the following state government agencies:
  - Department of Aboriginal and Torres Strait Islander Partnerships (DATSIP)
  - Department of Agriculture and Fisheries (DAF)
  - Department of Environment and Science (DES) (including the former Department of Environment and Heritage Protection and the former Department of National Parks, Sport and Racing)
  - Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP) (including the former Department of State Development)
  - Department of Transport and Main Roads (DTMR)
  - Department of Natural Resources, Mines and Energy (including the former Department of Natural Resources and Mines)
  - Queensland Health (QH)
- advice from Cairns Regional Council (CRC).

The steps taken in the EIS process for the project are documented on the project's webpage at [www.statedevelopment.qld.gov.au/cairnssdp](http://www.statedevelopment.qld.gov.au/cairnssdp)

## 3.1 State environmental impact assessment process

### 3.1.1 Coordinated project declaration

On 24 September 2012, I declared this project to be a 'significant project'<sup>5</sup> under section 26(1)(a) of the SDPWO Act. This declaration initiated the statutory environmental impact evaluation procedure of Part 4 of the SDPWO Act, which required the proponent to prepare an EIS for the project.

### 3.1.2 Terms of reference

The draft terms of reference (TOR) for the EIS for the project were released for public and advisory agency comment from 29 September 2012 to 29 October 2012. Comments were received from advisory agencies, non-government organisations and the public.

The draft TOR was amended having regard to comments received and issued to the proponent as the final TOR on 30 November 2012.

### 3.1.3 Review of the draft EIS

The draft EIS prepared by the proponent was released for public and agency comment from 18 April 2015 to 1 June 2015. Comments were received from 193 submitters, including 17 submissions from local, state and commonwealth agencies, 9 submissions from non-government organisations and 167 from individual submitters. Of these, 119 were identified as identical pro-forma submissions. An additional six submissions were received after the public notification period had closed.

The most prominent issues raised in submissions on the draft EIS included:

- potential impacts of dredging and disposal of dredge material on marine and terrestrial ecology
- management of potential acid sulfate soils (PASS) and other contaminants arising from the disposal of dredge material
- potential noise and vibration impacts underwater from dredging and land-based construction activities
- potential air quality impacts, especially relating to shipping traffic and land-based construction activities
- cultural heritage and native title implications, particularly regarding land-based disposal of dredge material
- conflict with the change in State and Commonwealth government's policy prohibiting sea disposal of capital dredge material
- economic impacts of the preferred development options on the local and regional economy.

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<sup>5</sup> Amendments to the SDPWO Act in December 2012 resulted in the replacement of the term 'significant project' with 'coordinated project'.



### 3.1.4 Review of the RDEIS

On 28 July 2015, I requested the proponent submit a RDEIS addressing issues raised in draft EIS submissions listed in Section 3.1.3. On 23 June 2017, the proponent submitted the RDEIS and I approved its release for public and agency comment from 12 July 2017 to 25 August 2017. Comments were received from 7665 submitters, including 12 submissions from local and state government agencies, 9 submissions from non-government organisations and 14 from individual submitters. Of these, 7630 were identified as pro-forma submissions.

Submissions on the RDEIS raised issues regarding:

- placement and management of dredge material at the Northern Sands DMPA
- impacts on groundwater quality at Northern Sands DMPA, surface water quality of Barron River and marine water quality within the Trinity Inlet and the Great Barrier Reef
- flooding risks associated with the Northern Sands DMPA
- assessment of matters of state environmental significance
- potential economic impacts to tourism businesses at Yorkeys Knob and overall project need.

### 3.1.5 Supplementary information to the RDEIS

On 4 October 2017, I requested the proponent submit additional information responding to submissions received on the RDEIS including:

- identification of management measures for the treatment of potential acid sulfate soils (in accordance with Queensland Acid Sulfate Soil Management Guidelines [DSITI, 2004]) to be included in Acid Sulfate Soil Management Plan
- the footprint and layout of the Northern Sands DMPA and the dredge material placement process and timeframes to address potential flood impacts, water quality impacts, groundwater impacts and acid sulfate soil impacts
- proposed water quality limits for groundwater and surface water, including tailwater discharge limits and monitoring locations
- updates to the proposed dredge management plan, including clarification of potential sedimentation impacts
- further information regarding the project's impact to the Trinity Inlet declared fish habitat area and any proposed offset requirements
- approvals required for the project, specifically, the interaction with existing approvals over the Northern Sands DMPA
- further benchmarking information to determine the health of coral within the dredging impact zone
- further information on cultural heritage impacts on the state heritage listed Cairns Wharf precinct
- economic benefits of the project, in particular for industries in the Cairns region.

The proponent provided additional information on 7 November 2017 and 14 December 2017.

### **3.1.6 Key issues raised in submissions**

I have reviewed the EIS documentation, supplementary information provided by the proponent, submissions and other material relevant to the project. I have considered each of the submissions and how the information provided by the proponent addressed submitter issues in my evaluation of the project.

I note that many submissions to the EIS were made in relation to potential impacts that are no longer relevant for the assessment of the project. Such impacts include those associated with the disposal of capital dredge material at sea, the previously proposed depth and width of the channel dredging works and the previously proposed volume of dredge material to be removed (4.4 million m<sup>3</sup> reduced to 1 million m<sup>3</sup>).

## **3.2 Commonwealth environmental impact assessment**

### **3.2.1 Matters of national environmental significance**

On 4 October 2012, the then Commonwealth Environment Minister's delegate determined that the project is a 'controlled action' under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) (EPBC 2012/6538). The relevant controlling provisions under the EPBC Act are:

- World Heritage properties, sections 12 and 15A
- National Heritage places, sections 15B and 15C
- Listed threatened species and communities, sections 18 and 18A
- Listed migratory species, sections 20 and 20A
- Commonwealth marine areas, sections 23 and 24A
- Great Barrier Reef Marine Park, sections 24B and 24C
- Commonwealth land, sections 26 and 27A.

The EIS assessment process has been conducted in parallel by the Queensland Government and separate to the Australian Government. The Australian Government Department of Environment and Energy (DEE) will assess impacts on matters of national environmental significance (MNES) and will make a separate project approval decision under the EPBC Act.

## **4. Project approvals**

Following the release of this report, the proponent would be required to obtain statutory approvals from Commonwealth, state and local government jurisdictions before the project can proceed. Table 4.1 provides a list of key approvals required for the project.

The proponent acknowledges that further information may be required for subsequent approvals as part of the construction phase and operational phase of the Cairns Shipping Development Project.

**Table 4.1 Key approvals required for the project to proceed**  
(Source: RDEIS Chapter 4)

Project component	Permit/approvals	Legislation	Assessment Manager
<b>Commonwealth approvals</b>			
Whole of project	Controlled action (EPBC 2012/6538)	EPBC Act	DEE
<b>State approvals</b>			
Capital dredging to widen and deepen the Port of Cairns access channel (dredging, delivery, placement and tailwater management for soft and stiff clays in the DMPAs)	Environmental Authority (EA) for an environmentally relevant activity (ERA 16(1)(d)—dredging more than 1 000 000 t in a year)	<i>Environmental Protection Act 1994</i> (EP Act), Environmental Protection Regulation 2008 (EP Regulation)	DES
	Development permit for a material change of use (MCU)—ERA 16(1)(d)—dredging more than 1 000 000 t in a year	<i>Planning Act 2016</i> (Planning Act) and Planning Regulation 2017 (Planning Regulation), EP Act	CRC Port Authority (PA) DSDMIP – State Assessment Referral Agency (DSDMIP/SARA)
	Quarry material allocation notice—Removing material from state coastal land under tidal waters	<i>Coastal Protection and Management Act 1995</i> (CPM Act)	DES
	Development permit for operational works—capital dredging works in tidal waters (channel and swing basin)	Planning Act and Planning Regulation, CPM Act	(DSDMIP/SARA)
	State Marine parks permit to carry out works for dredging within the Trinity Inlet Segment of the GBRCMP to enlarge the shipping channel	<i>Marine Parks Act 2004</i> (Marine Parks Act)	DES

Project component	Permit/approvals	Legislation	Assessment Manager
	Development permit for operational works: – works completely or partly within a declared fish habitat area – disturbance to marine plants (seagrass in dredge footprint)	Planning Act and Planning Regulation,  <i>Fisheries Act 1994</i> (Fisheries Act)	DSDMIP/SARA
	Resource Allocation Authority	Fisheries Act	DAF
Dredge material delivery pipeline and pump-out facility	Development permit for operational works—tidal works within a coastal management district	Planning Act and Planning Regulation, CPM Act	(DSDMIP/SARA)
	Development permit for operational works—clearing native vegetation	Planning Act and Planning Regulation,  <i>Vegetation Management Act 1999</i> (VM Act)	DSDMIP/SARA
	Development permit for operational works—works involving constructing or raising waterway barrier works	Planning Act and Planning Regulation,  Fisheries Act	DSDMIP/SARA
	State Marine parks permit to:  - carry out works for sand scraping at the mouth of Richters Creek  - install and decommission, and to operate, a temporary pipeline facility, the pump-out facility/dredge mooring facility and a temporary discharge pipe for waste within the	Marine Parks Act	DES

Project component	Permit/approvals	Legislation	Assessment Manager
	Marlin Coast Segments of the GBRCMP		
Tailwater discharge pipeline (Northern Sands)	Development permit for operational works for tidal works	Planning Act and Planning Regulation, CPM Act	DSDMIP/SARA
Whole of project	Approval of Cultural Heritage Management Plan (CHMP)	<i>Aboriginal Cultural Heritage Act 2003</i> (ACH Act)	DATSIP
Works on heritage place including demolition of wharf 6	Development permit for Building Works	Planning Act and Planning Regulation,  <i>Queensland Heritage Act 1992</i>	DSDMIP/SARA
State transport corridors (infrastructure- related referrals)	Works within state- controlled road corridor	TI Act	DSDMIP/SARA DTMR
Assessable development within Strategic Port Land	Advice/assessment against the TI Act and Ports North (Cairns Port Authority) Land Use Plan (LUP)	TI Act, LUP	DSDMIP/SARA Ports North
<b>Local government</b>			
Barron Delta (Northern Sands) DMPA	Development permit for MCU approval (for an Undefined Use under the Cairns Regional Planning Scheme 2016) for the placement of dredge material	<i>Cairns Regional Planning Scheme 2016</i> (CairnsPlan)	CRC
	Development permit for operational works—construction of pipeline and temporary bunds	CairnsPlan	CRC
	Development permit for operational works—prescribed tidal works	CairnsPlan	CRC

## 4.1 Australian government approvals

On 4 October 2012, a delegate for the then Commonwealth Minister for Sustainability, Environment, Water, Population and Communities determined that the project is a 'controlled action' under the EPBC Act (EPBC ref. 2012/6538).

On 30 June 2017, the proponent requested a variation of proposal to take an action under the EPBC Act because of changes to state and federal legislation banning the disposal of capital dredge material within the GBRMP and the Great Barrier Reef World Heritage Area. On 25 July 2017, a delegate of the Minister for the Environment and Energy accepted the variation. On 29 July 2017, the RDEIS was publicly notified in accordance with the requirements of the EPBC Act.

As discussed in section 3.2.1, the EIS assessment process has been conducted in parallel by the Queensland government and separate to the Australian government. DEE will assess impacts on MNES and will make a separate project approval decision under the EPBC Act.

## 4.2 State government approvals

### 4.2.1 Environmental Protection Act 1994

A key management tool under the EP Act is the regulation of ERAs. An EA is required to carry out an ERA. In accordance with section 47C of the SDPWO Act, I have stated conditions in Appendix 2 for inclusion in an EA for ERA 16(1)(d) (dredging more than 1 000 000 tonnes per year). The EA is for capital dredging to widen and deepen the shipping channel, as well as delivery, placement and tailwater management for soft and stiff clays in the DMPAs.

### 4.2.2 Planning Act 2016

On 3 July 2017, the *Sustainable Planning Act 2009* was replaced by the Planning Act. In accordance with section 37 of the SDPWO Act, I have stated conditions for a development permit for a MCU for an ERA.

In accordance with section 39 of the SDPWO Act, I have stated conditions for a development permit for operational works for tidal works (capital dredging—channel and swing basin) and a preliminary approval for operational works for tidal works in a coastal management district (delivery pipeline and pump-out facility). Stated conditions are provided in Appendix 2 of this report which must be adopted by SARA when an application is made by the proponent for any operational works approvals within the defined coastal management district as defined by the CPM Act.

I have also stated conditions for a development permit for operational works for marine-based works within a declared FHA under the Fisheries Act and for clearing of native vegetation under the VM Act. SARA must also adopt these conditions when assessing the respective applications.



### **4.2.3 Coastal Protection and Management Act 1995**

Under section 101(1) of the CPM Act, the proponent will be required to hold a current quarry material allocation notice that authorises the taking and use of quarry material from state coastal land under tidal water.

### **4.2.4 Marine Parks Act 2004**

The proposed dredging at Trinity Inlet shipping channel and Trinity Bay is situated within the General Use Zone of the Great Barrier Reef Coast Marine Park (GBRCMP) and will require a Marine Parks Permit in accordance with the Marine Parks Act. In accordance with section 52 of the SDPWO Act, I have recommended conditions in Appendix 3 to guide the assessment manager in the assessment of the corresponding application.

## **4.3 Local government approvals**

The project is located within the CRC local government area (LGA). The approvals required from CRC under the CairnsPlan 2016 for the project include an MCU approval for land placement of dredge material in the Northern Sands DMPA and operational works approvals for the proposed Northern Sands DMPA bund wall and delivery pipeline.

In accordance with Section 39 of the SDPWO Act, I have stated conditions in Appendix 2 for a development permit for an MCU for the land placement of dredge material at the Northern Sands DMPA. Under Section 37 of the SDPWO Act, the information and referral stage and notification stage prescribed by the Planning Act will not apply to the assessment of this development approval. These stated conditions must be adopted by CRC when an application is made by the proponent for the MCU application.

Project activities undertaken wholly on Strategic Port Land (including the proposed Tingira Street Stiff Clay DMPA) are exempt from assessment against the local government planning scheme (the CairnsPlan 2016), as per the provisions of the TI Act, which prescribes Ports North as the Assessment Manager.

The project will necessitate numerous subsequent approvals for various aspects of the development, including the offshore dredging and land-based disposal of dredge material at the Northern Sands DMPA.

The assessment manager for these works will vary depending on the location, tenure and nature of the proposed development and could be either CRC, Ports North, DES and/or SARA, depending on how the applications are coordinated.

## 5. Capital dredging and port upgrades

### 5.1 Introduction

This section evaluates key environmental impacts associated with capital dredging and port upgrades for the project. For a description of the pre-construction, construction and decommissioning activities relating to capital dredging and port upgrades refer to Section 2 (About the project).

Activities associated with capital dredging and port upgrades could affect marine water quality, coastal environment, MSES, State and Aboriginal cultural heritage, existing traffic and transport, noise and vibration, and air quality. My evaluation of these impacts is discussed in the following sections.

### 5.2 Existing environment

#### 5.2.1 Marine and coastal environment

##### Marine water quality

Trinity Inlet is a natural harbour characterised by naturally high siltation due to marine sediments being disturbed by natural coastal processes. The proponent currently undertakes annual maintenance dredging to ensure safe navigation for vessels using the existing port. In certain sections of the channel, maintenance dredging of up to 1.7 m is undertaken below the designed channel depth to counter the ongoing siltation of the channel.

Trinity Inlet is fed by freshwater creeks which drain small catchments, including Smiths Creek, Skeleton Creek, Redbank Creek, Chinaman Creek and Fearnley Street Drain. These creeks discharge urban and industrial inputs into Trinity Inlet.

Trinity Bay forms part of the Coral Sea and extends east to Cape Grafton and north to Double Island. The Great Barrier Reef is located 25 to 30 km offshore to the northeast.

Existing water quality within Trinity Inlet and Trinity Bay is characterised by naturally high turbidity levels,<sup>6</sup> especially during periods of high rainfall and sustained winds and currents which resuspend seabed sediments. The water within near-shore areas is shallow and characterised by muddy benthic sediments, which are regularly resuspended. In areas further offshore, turbidity levels are lower due to deeper waters and less resuspension of benthic sediments.

There is a commercial aquaculture enterprise that operates a finfish hatchery, reliant on maintaining existing water quality, which intakes and discharges seawater at Smiths Creek and Chinaman Creek. The aquaculture water intake is located on the city side bank of Smiths Creek approximately 900 m upstream from the nearest capital dredging

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<sup>6</sup> A measurement of sediment suspended in water

proposed for the Smiths Creek swing basin, at the confluence of Smiths Creek and Trinity Inlet.

### Marine sediment quality

The Port of Cairns is situated within a heavily urbanised catchment, and the system is exposed to a range of contaminants associated with adjacent and upstream agricultural, residential, commercial and industrial land uses.

Characteristics of background marine sediment quality in the project area include:

- inner port and outer channel dominated by silt and clay sediments, with small proportions of sand and gravel (e.g. near mouth of Trinity Inlet)
- surface sediments in the proposed dredge area not considered to be potential acid sulfate soil (PASS) material, but a proportion of deeper soft clay and silt sediments to be extracted during capital dredging are expected to be PASS material
- concentrations of metals and metalloids generally below national screening levels under the *National Assessment Guidelines for Dredging 2009* (NAGD)<sup>7</sup>, except arsenic, which is recognised as being naturally elevated in the Cairns region
  - arsenic levels in the project area remain below the Local Screening Level as agreed in the existing *Long Term Management Plan – Dredging and Disposal* for maintenance dredging activities<sup>8</sup>
- levels of other contaminant types were either below laboratory detection levels or below national screening levels under the NAGD in recent sampling of the existing shipping channel and port.

### Coastal processes

The key coastal processes of Trinity Bay and Trinity Inlet are summarised in Table 5.1.

**Table 5.1 Summary of key components of coastal processes in Trinity Bay and Trinity Inlet (Source: RDEIS Chapter B3)**

Type of coastal process	Process components
Hydrodynamics	<ul style="list-style-type: none"><li>• Water levels relating to tides and storm surges</li><li>• the wave climate, comprising of Coral Sea waves propagating into the GBR Lagoon through passages in the outer reef, wind waves within the GBR Lagoon and refracting into Trinity Bay, and short periods of wind waves generated within Trinity Bay</li><li>• currents within Trinity Bay, generated predominantly by tidal and wind forces</li><li>• freshwater inflows from the Barron River and Trinity Inlet</li><li>• tidal flows affecting seabed and bank stability in the Barron River and Trinity Inlet</li><li>• key influencing factors of cyclones and other severe weather events.</li></ul>

<sup>7</sup> <http://www.environment.gov.au/topics/marine/marine-pollution/sea-dumping/dredged-material>

<sup>8</sup> Agreed between the proponent, GBRMPA and Cairns Port Technical Advisory Consultative Committee Authority, available via <https://www.portsnorth.com.au/environment-community/environment/>

Type of coastal process	Process components
Marine sedimentation	<ul style="list-style-type: none"> <li>• Fluvial sediment supply from the rivers and streams, which may be fine wash load that extends out into the Trinity Bay before settling to the seabed or coarser sand that deposits near the stream mouths and may be re-distributed along the coast by wave/currents action</li> <li>• Trinity Bay seabed sediment re-suspension, transport and deposition, potentially changing the seabed morphology or sediment composition and/or infilling dredged areas.</li> </ul>
Shoreline sedimentation	<ul style="list-style-type: none"> <li>• Sand transport along the coast, driven by wave breaking</li> <li>• beach erosion and accretion along the adjacent beach system, including the Northern Beaches</li> <li>• factors affecting and required for beach stability.</li> </ul>

## 5.2.2 Matters of state environmental significance

### Trinity Inlet declared fish habitat area

The Trinity Inlet declared fish habitat area (FHA) covers a 7212 ha area at Trinity Inlet and Trinity Bay except for the Cairns Port area and shipping channel.

The current shipping channel is within a 200 m wide exclusion area from the Trinity Inlet declared FHA. The exclusion area was put in place at the time of declaration of the FHA in 1998 to cater for possible future expansions of the shipping channel. At that time, it was assumed future expansion of both sides of the channel would be at equal distances, whereas this project proposes widening of the channel on the western margin only.

The habitat values of the FHA include extensive mangrove zones, seagrass beds off the Cairns esplanade, patchy areas of saltmarsh and intertidal flats. The FHA provides important nursery habitat areas for several species of fish, prawns and mud crabs.

### Marine plants and coral reefs

Up to 800 ha of seagrass meadows have been mapped previously in and around Cairns. Seabed areas within Trinity Bay, at the mouth of Barron River, near False Cape, along the east side of Cape Grafton and near the existing offshore Cairns Port DMPA are identified as potential seagrass habitat areas based on historic records.

Seagrass surveys undertaken in 2015 identified six seagrass meadows within Trinity Bay, located along the eastern and western boundaries of the existing Trinity Inlet shipping channel (refer to Figure 5.1). Seagrass meadows along the boundaries of Trinity Inlet are currently considered to be of poor or very poor condition due to limited biomass and area, but are showing signs of recovery.

The nearest coral reefs to the project are at Mission Bay, 5 km to the east of the existing Trinity Inlet shipping channel. Coral reefs located closest to the dredging area and port upgrade activities include:

- Double Island and Haycock Reefs to the north and south of Double Island, approximately 18 km north of the project, considered to be in excellent condition

with some resilience to periods of increased turbidity as occurs during natural disturbance events

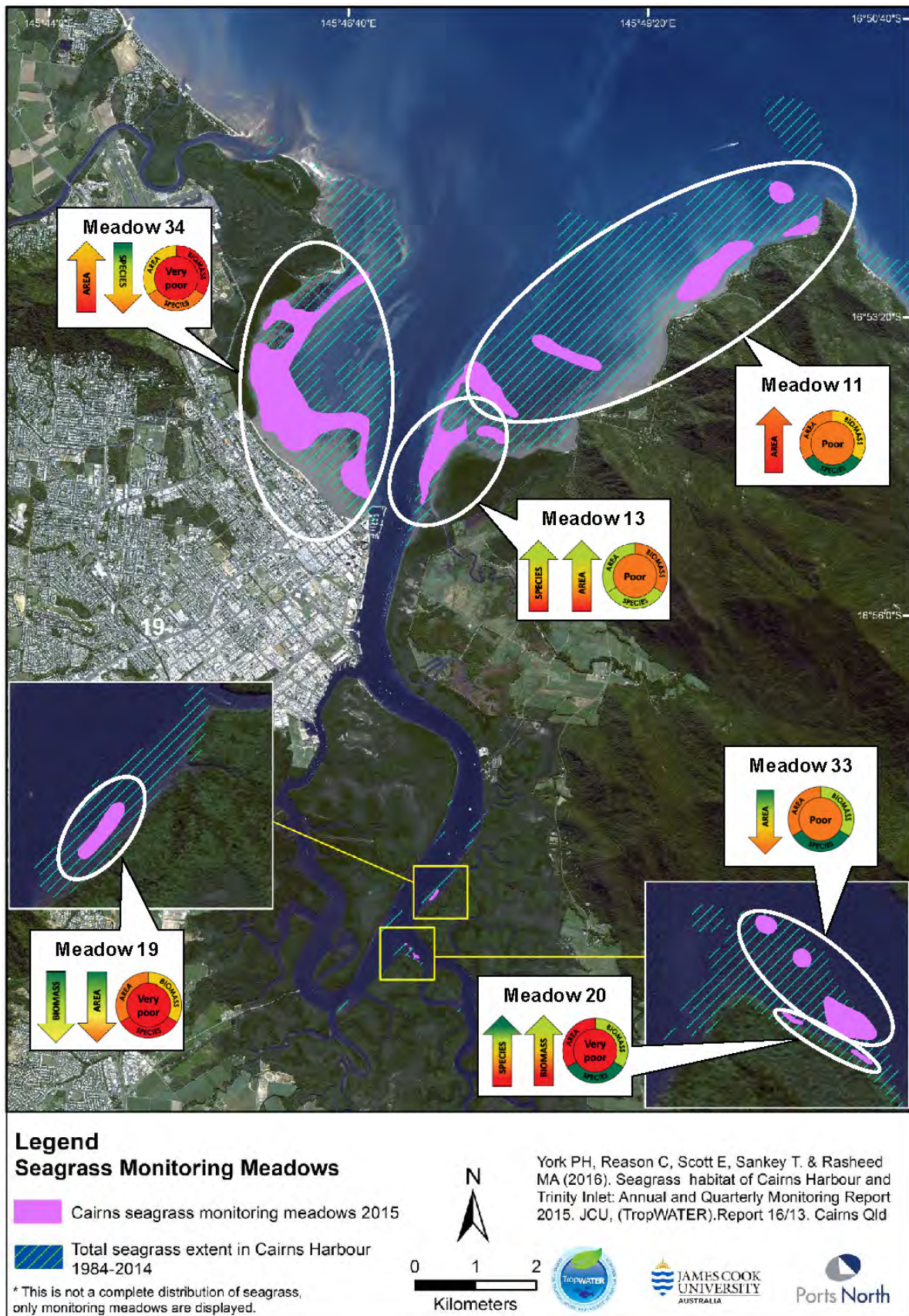
- Rocky Island Reef within Mission Bay, considered to be of degraded condition with coral species most resilient to disturbance remaining
- a small fringing reef at Taylor Point, 12 km north of Cairns
- a series of unnamed rocky shores supporting fringing reefs along the east side of Cape Grafton, over 8 km from the project.

Mid-shelf reef systems are located further offshore, over 20 km north-east of the project area.

Soft sediment habitats in Trinity Inlet and Trinity Bay include sandy beaches, intertidal mudflats and subtidal soft sediments. These can be key drivers in coastal marine food chains, and unvegetated soft sediment habitats vary considerably in response to changes in seagrass meadow extent.

The EIS documentation indicates that benthic communities were found only in low densities in Trinity Inlet. The EIS documentation described sediment macroinvertebrates ('infauna') in offshore and estuarine project areas as having significantly varying community assemblages. These were across sediment class and locations of sampling (by coastline proximity and depth), with variations in species diversity between wet and dry seasons.





**Figure 5.1 Seagrass Monitoring Meadow Condition in Cairns Harbour**

## 5.2.3 Cultural heritage

### Queensland cultural heritage

#### Cairns Wharf Complex

The Cairns Wharf Complex is listed as a state heritage place (ID: 601790) for aesthetic, scientific, historic and social values.

Wharves 1 to 5 and their associated sheds were originally constructed from 1910-1929. A new building was constructed in 1984 as a cruise liner terminal, opening the wharf to cruise ships.

Wharf 6 was constructed during WWII and demonstrates the importance of Cairns as a centre for Pacific forces. Its timber and reinforced concrete construction reflect war-time expediency. It is in poor condition from weather exposure and borer infestation. The structural assessment in the EIS documentation found that wharf 6 does not comply with current Australian standards for the design of maritime structures (AS4997-2005) and is not fit for purpose.

#### Malay Town

Malay Town was a multicultural camp located at the mouths of Alligator and Lily Creeks from the late 1890s. It was demolished in the 1940s to reclaim land to expand the Cairns wharf area. While it is not a state heritage place, it may be possible that archaeological material from the camp may be uncovered during upgrading works at the Port of Cairns.

#### Underwater cultural heritage artefacts

At least three historic shipwrecks, the *Adieu*, *Mary* and *Miro*, may be located within the proposed Crystal Swing Basin. However, the exact locations and integrity of the wrecks are unknown and the EIS documentation notes that such material has not been uncovered in any maintenance dredging programs to date.

### Aboriginal and Torres Strait Islander cultural heritage

The shipping channel, the wharf, Admiralty Island and Trinity Inlet contain story places significant to the Gimuy Walubara Yidinji people, who have a registered native title claim over part of Cairns that includes the port and part of the shipping channel.

## 5.2.4 Maritime transport

The Crystal swing basin is the principal swing basin currently used by cruise ships to access Wharves 1–5. The Main swing basin is primarily used by cargo ships berthing at the general cargo wharves, fuel berth and sugar wharf as well as vessels berthing at the Cairns Naval Base.

Currently, almost half of the cruise ships visiting the Cairns area are unable to enter the Port of Cairns due to their size. Mega class ships (up to 300 m in length) currently anchor offshore at Yorkeys Knob, located 15 km north of Cairns.

In 2016, a total of 64 ships visited Cairns. Forty of these ships used the Cairns Cruise Liner Terminal (the terminal) and 24 anchored offshore at Yorkeys Knob. These numbers were an increase from 2015 figures of 20 and 15 respectively.

The EIS documentation reported that there are a number of people who reside aboard boats moored in Trinity Inlet.

### **Transport terminal (Wharf)**

Wharves 1-5 at the Port of Cairns are currently available for a variety of passenger vessels. In addition, Wharves 1-3 are predominately used for berthing cruise vessels and are serviced by a passenger terminal building (the terminal). The terminal is designed for cruise ships berthing in transit and home port arrangements and the facility can cater for up to 3100 transit passengers at one time. The terminal is capable of catering for transit passengers for mega class vessels and home porting vessels with greater than 600 passengers.

## **5.2.5 Noise and vibration**

Existing noise sources surrounding the Port consist of traffic noise from local roads and mechanical plant noise from surrounding residential buildings (e.g. exhaust fans). Additional existing noise sources include both naval and cargo shipping movements, and aircraft noise from the Cairns airport. Natural noise sources are also present (e.g. wave noise).

The EIS documentation identified surrounding hotels, apartments and moored residences within the Trinity Inlet shipping channel as the key sensitive receptors. These sensitive receptors are generally located approximately 100 m from the proposed wharfside construction area. The moored residences and hotels along Lake, Wharf and Abbott Streets are the closest sensitive receptors to the construction area.

## **5.2.6 Air quality**

All background pollutant concentrations are below the air quality objectives. Thirty industrial activities are located within 3 km of the port. Air pollutants emitted from these activities and the burning of fuel oil<sup>9</sup> from ships in port include:

- sulphur dioxide (SO<sub>2</sub>)
- carbon monoxide (CO)
- nitrogen oxides (NO<sub>x</sub>) (refers to nitrogen monoxide (NO) and nitrogen dioxide (NO<sub>2</sub>))
- volatile organic compounds (VOCs)
- particulates (PM<sub>10</sub> and PM<sub>2.5</sub>).

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<sup>9</sup> A generic term to describe fuels used to generate motion.



The EIS identified benzene, benzo(a)pyrene, total suspended particles (TSP)<sup>10</sup> as the key air pollutants in the project area. Subsets of TSP includes particulates (PM<sub>2.5</sub> and PM<sub>10</sub>)<sup>11</sup> and dust deposition.<sup>12</sup> The EIS stated that air quality objectives would currently only be exceeded during regional events such as bushfires, dust storms or occasional burning of sugarcane waste during harvesting season.

## 5.3 Marine and coastal environment

Capital dredging and port upgrades for the project have the potential to impact on a range of marine and coastal values, including water quality in Trinity Inlet and Trinity Bay, ecological communities such as seagrass meadows, coral communities and other significant species and habitats. This section evaluates these potential impacts and the mitigation and management measures proposed in the EIS documentation.

### 5.3.1 Submissions received

Key issues raised in submissions on the EIS documentation related to marine water quality and coastal processes associated with the proposed capital dredging and port upgrades including:

- need for validation of dredge modelling under different wave and tidal conditions
- need for selective dredging of potential acid sulphate soil (PASS) material and appropriate procedures within the Dredge Management Plan
- potential water quality impacts on seagrass and coral
- potential hydrodynamic and siltation impacts of widening the shipping channel
- cumulative impacts on water quality where capital and maintenance dredging occur sequentially.

I have considered all submissions on the EIS documentation in my evaluation of the project.

### 5.3.2 Methodology

#### Marine water quality

Historical data for marine water quality was collated and presented in the RDEIS including previous project assessments in 2013-2014 and data from maintenance dredging water quality monitoring collated to 2013. Additional water quality data was collected in July 2016 (dry season) and March 2017 (wet season) and presented in the RDEIS supplementary report to support existing baseline marine water quality data relevant to project elements and activities.

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<sup>10</sup> The total of all particles suspended in the air.

<sup>11</sup> Particulate matter with an aerodynamic diameter less than 2.5 or 10 micrometres. Particles of 2.5 micrometres (fine particles) can be drawn deep into the lungs, while particles of 10 micrometres (coarse particles) tend to be trapped in the nose and throat.

<sup>12</sup> TSP can be measured as the weight of dust falling on a given area over time.

Data was collected in areas of key sensitive ecological communities where potential impacts from proposed capital dredging and placement of the dredge material could occur. These sites included:

- Palm Cove Beach, representing coral reefs at Double Island
- Yorkeys Knob, generally representing Northern Beaches
- Trinity Bay, generally representing historical subtidal seagrass areas
- Trinity Inlet (Upper reaches), generally representing remnant seagrass in Trinity Inlet
- Cape Grafton, generally representing corals in Mission Bay
- False Cape, generally representing historic seagrass areas near False Cape
- Trinity Inlet (Lower reaches), generally representing areas near Port of Cairns.

Key water quality parameters tested in sampling included physico-chemical, total suspended solids (TSS) and turbidity, Photosynthetically Active Radiation (PAR), metals, nutrients, oil and grease. Total petroleum hydrocarbons were monitored, but none were detected.

Modelling was undertaken using two dredging scenarios, representing the lower and upper bounds of likely dredging works:

- Scenario 1 – lower end of the expected total dredge material volume (710 000 m<sup>3</sup> of soft material from the channel and 100 000 m<sup>3</sup> of stiff clay material from the inner channel and harbour) and limited overflow from the TSHD (maximum 10 minutes of overflow)
- Scenario 2 – upper end of the expected total dredge material volume (900 000 m<sup>3</sup> of soft material from the channel and 100 000 m<sup>3</sup> of stiff clay material from the inner channel and harbour) and less-restricted overflow from the TSHD (30 minutes of overflow per cycle).

Modelling of both dredging scenarios was undertaken over three different weather periods (representing a range of wind and wave conditions) with the best and worst of the modelling outputs representing the likely best-case and likely worst-case scenarios. Worst-case scenario is representative of a conservative assessment with potential impacts likely to be lower than predicted.

The modelling did not consider extreme climatic events as these events would occur during the wet season and the proposed capital dredging will only be undertaken during the dry season.

Assessment of potential marine water quality impacts were developed using a 'zones of impact' method (see Table 5.2), which is recommended by the Commonwealth EIS Guidelines and the Great Barrier Reef Marine Park Authority (GBRMPA) Modelling Guidelines for dredging environmental assessments.

Zones of impact were used to inform a risk-based assessment of predicted water quality impacts, considering the consequence, duration and likelihood of impacts to provide a risk rating to inform development of mitigation and management measures.



A cumulative dredging assessment was also undertaken whereby zones of impact and influence resulting from model outputs for capital dredging were assessed together with zones from model outputs for a typical maintenance dredging campaign.

**Table 5.2 Description of zones of impacts (Source: RDEIS Chapter B5)**

Zones of impact	Description
Zone of influence	Extent of detectable plume, but no predicted ecological impacts.
Zone of low to moderate impact	Water quality impacts resulting in predicted sub-lethal impacts to ecological receptors and/or mortality with recovery between 6 months (lower end of range) to 24 months (upper end of range)
Zone of high impact	Water quality impacts resulting in predicted mortality of ecological receptors with recovery time greater than 24 months

I am satisfied that the impact assessment methodology presented in EIS documentation was sufficient to identify the extent of potential capital dredging impacts on marine water quality.

### Marine sediment quality

Marine sediment quality was assessed based on historical sampling and monitoring data on samples of overlying maintenance dredge material across the project area (until 2013). Analysis of this historic data defined the scope for additional sampling for the project area between 2014 and 2017, which specifically targeted underlying capital dredge material. Results of this targeted sampling were considered along with marine water quality and coastal process modelling to identify where project activities have the potential to impact on sediment quality in the project area.

### Coastal processes methods

Coastal systems were considered in two categories – Trinity Bay and Inlet marine hydrodynamic and sedimentation processes, and Cairns littoral and beach system processes. Historic data sources informed a baseline understanding of coastal processes. These data sources included hydrographic surveys and navigation charts of the port and shipping channel, and Commonwealth Bureau of Meteorology wind and meteorological data between 2013-2015.

Hydrodynamic and regional tide modelling was undertaken and calibrated with tide level, pressure, conductivity and temperature data. Model outputs and analysis of predicted impacts were presented in the RDEIS.

### Cumulative dredging

Cumulative assessment presented in the EIS documentation considered modelling outputs for capital dredging along with model outputs from a typical maintenance dredging campaign.

### 5.3.3 Impacts and mitigation measures

#### Marine water quality

High suspended sediment concentrations are common in the project area, driven primarily by south-west trade winds during the dry season, north and north-east winds and tropical cyclones during the wet season. During the dry season, the wind, current and wave climates drive seabed mud resuspension. During the wet season, salinity is typically lower closer to Trinity Inlet than during the dry season, due to influence of increased freshwater inflows.

Water quality in Queensland is measured by quantification of parameters against water quality objectives (WQOs), as stipulated for waters in the *Environmental Protection (Water) Policy 2009*. All but one monitoring region presented in the EIS documentation demonstrated background median turbidity levels that exceed WQOs for both wet and dry seasons.

Trinity Inlet and Trinity Bay pH levels increased (i.e. became more basic) with increased connection with the open ocean, likely due to the influence of more acidic conditions of catchment flows and acid sulphate soils, and because of the basic nature of oceanic water. Generally, pH levels were compliant with relevant WQOs in the study area, except for one region of testing during the dry season where median pH was slightly above the WQO value.

While there are some exceedances of WQO values for background marine water quality in the study area, this is not unexpected of a marine environment located adjacent to an urban and industrialised area.

Without mitigation, capital dredging and the upgrade of port infrastructure has the potential to impact on marine water quality within Trinity Inlet and Trinity Bay. Key potential water quality impacts are discussed below.

As dredging is proposed within the Queensland GBR Coast Marine Park, the project will require a state marine park permit for dredging work within Trinity Inlet, in accordance with the *Marine Parks Act 2004*. The state marine parks permit will provide protection for values in the General Use Zone of the Great Barrier Reef Coastal Marine Park. I have recommended stated conditions for the state marine parks permit in Appendix 3.

#### Turbidity

Capital dredging has potential to affect marine water quality by generating turbid plumes and releasing sediment particles into the water body (sediment deposition), both of which could affect seagrass and coral reefs. Consideration of the potential impacts of water quality and sediment deposition on these sensitive ecological receptors is considered in Section 5.4 (MSES).

The EIS documentation reported that when compared to existing turbidity conditions, the dredging campaign would increase turbidity values at most locations by less than seven per cent for the duration of dredging. Further assessment was undertaken for locations where turbidity is predicted to increase substantially, including Trinity Bay

next to channel dredging, and in Trinity Inlet. Time series data comparing dredging plumes with naturally occurring turbidity levels indicates that naturally occurring sediment due to resuspension would remain the dominant source of predicted turbidity at all sites.

#### *Inner port dredging*

Dredge plume modelling results indicate that short-term (12 weeks), minor impacts are expected resulting from turbid plumes generated from capital dredging within the inner port area.

Based on the worst-case scenario and using the zones of impact method, the EIS documentation identified that no zones of high impact would occur within the inner port area. A zone of low to moderate impact is predicted to extend approximately 2 km southwards along Trinity Inlet and approximately 2 km northwards adjacent to the channel. Predicted impacts within this low to moderate zone include sub-lethal impacts and/or mortality to ecological receptors, with recovery between 6 to 24 months. The zone of influence, with no predicted ecological impact, is predicted to extend from the inner port southwards along Trinity Inlet. Further consideration of predicted zones of impact and influence against sensitive ecological receptors is presented in Section 5.4 (MSES).

The commercial aquaculture enterprise that operates a finfish hatchery with a water intake located on the city-side bank of Smiths Creek is within the predicted zone of influence only, and only under the modelled worst-case scenario.

#### *Outer channel dredging*

Modelling results indicate that short-term, minor impacts are expected to result from turbid plumes generated from capital dredging in the outer channel. Using the zones of impact method for the modelled worst-case scenario:

- the zone of high impact was restricted to the channel area being dredged
- a relatively small zone of low to moderate impact is predicted near the bend in the channel close to the inner port area
- a zone of influence, with no detectable ecological impact expected, is predicted for remaining areas in the vicinity of outer channel dredging.

### **Sediment deposition**

Modelling presented in the EIS documentation predicts changes in sedimentation rates due to deposition of suspended sediments from dredge plumes within and adjoining the capital dredge footprint. Consideration of predicted zones of impact and influence against sensitive ecological receptors is presented in Section 5.4 (MSES).

### **Potential acid sulfate soils**

Disturbance and exposure of potential acid sulphate soil (PASS) material is a potential impact of dredging activities which was raised in a number of public submissions. If dredged material was exposed to air for extended periods of time the PASS material could oxidise, which may impact on water quality via changes to pH levels. PASS

material represents approximately fifty-five per cent of the total proposed dredge volume.

As dredged material remains waterlogged during normal operation of the TSHD, the risk of oxidation is negligible. There are no expected water quality impacts associated with PASS for the capital dredging activities.

### **Ancillary infrastructure and services upgrades**

Pile driving required for port upgrade construction has the potential to impact on water quality. Construction plant and equipment may pollute marine waters (e.g. via fuel/oil, other contaminant spills) if not managed appropriately. The potential for fuel/oil spills as part of the construction phase of the project presents a short-term negligible impact.

Disturbance and mobilisation of marine sediments may occur as a result of construction activities besides dredging, particularly the pile driving activities associated with the structural upgrade to the existing shipping wharves. Direct impacts on benthic communities are considered in Section 5.4 (MSES).

### **Mitigation measures for water quality impacts associated with capital dredging and construction of port upgrades**

#### *Turbidity and sediment deposition*

In addition to existing management practices and monitoring programs for current Port of Cairns operations, potential impacts on turbidity and sediment deposition levels associated with capital dredging and port upgrades would be addressed by implementation of a Dredge Management Plan (DMP), including the following measures:

- TSHD and BHD dredge to operate only within the approved dredge footprint at all times
- dredging campaign to occur in dry season months (May to September) to minimise ecological risk associated with water quality impacts and risks associated with extreme weather events
- overflow dredging by the TSHD is undertaken in accordance with the approved overflow regime in the Dredge Management Plan
- dredge hopper compartment is to be kept watertight during all dredging activities, except emptying and washing of the hopper at the pump-out location
- ensure the top of overflow valves are not lowered during the transport component of the dredging cycles
- no high-pressure jets to be used on drag heads outside of the dredge footprint
- dredge to be fitted with a green valve to minimise the spatial extent of turbidity plumes generated.

As part of the DMP, a Reactive Monitoring Program would be prepared in line with guidance in the *Water Quality Review and Monitoring (SKM 2012)* document developed as part of the GBRMP's Strategic Assessment. This monitoring program would be implemented during the dredging campaign to monitor water quality at

locations of sensitive ecological receptors. The RMP is proposed to be overseen by a technical advisory group (TAG), which will determine parameters to be monitored, frequency of monitoring and reporting. I have recommended terms of reference for the TAG at Appendix 5. The RMP will consist of a water quality dredge plume turbidity monitoring program and a seagrass monitoring program.

I am satisfied with the proponent's commitment to validate the dredge modelling undertaken during the EIS process at the beginning of the dredge campaign under different wave and tidal conditions. This will input to the proposed Reactive Monitoring Program for capital dredging to be refined in conjunction with the TAG.

While measures in the DMP would protect water quality for the commercial operations water intake located on the city-side bank of Smiths Creek, I also recommend that the TAG consider a water quality monitoring location be included at the site of water intake for these commercial operations to ensure any unexpected impacts to water quality for intake water is identified and can be addressed.

Monitoring data would be collected and interpreted regularly and the data assessed against threshold triggers as overseen by the TAG, with appropriate management actions implemented if threshold triggers are exceeded. Real time data would be used to guide the dredging campaign and to monitor effectiveness of the mitigation measures.

If turbidity threshold triggers are exceeded, the proponent would undertake one of the following corrective actions (depending on extent of exceedance):

- **Level 1** investigation – undertake initial water quality assessment to determine if the turbidity thresholds are exceeded due to natural weather events.
- **Level 2** Management response level – review of operations by the dredge operator to control a water quality impact.
- **Level 3** Compliance level – immediate cessation of dredging or implementation of other mitigation measures such as moving the dredge away from the area where the exceedance occurs.

#### *Potential Acid Sulfate Soils*

As identified in the Acid Sulfate Soils Management Plan (ASSMP), provided within the EIS documentation, dredged material collected in the hopper of the dredge vessel during capital dredging will remain saturated during transport to the pump-out point. Under normal operating activities there is little opportunity for these materials to oxidise and generate acid. Contingency measures for equipment breakdown of longer than 24 hours are included in the DMP to address the potential for dredged material oxidation in the hopper.

The ASSMP aligns with the *Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines*. I have stated conditions at Appendix 2 which require an ASSMP be in place for any PASS that may be disturbed by project activities.



### *Ancillary infrastructure and services upgrades*

To address potential marine water quality impacts, management measures for land-based construction activities on port upgrades were presented within a Construction Environmental Management Plan (CEMP) in the EIS documentation. A further detailed CEMP to be developed by construction contractors will reflect measures included in the existing CEMP, the proponent's Environmental Management System (EMS) and the proponent's guidelines for CEMPs. Measures include:

- sampling of soils and testing for PASS material to determine treatment required during construction
- management of stormwater runoff
- actions to minimise soil erosion potential
- practices to minimise the risk of fuel/oil spills from construction plant and equipment.

Detailed CEMP measures would also be considered in assessment of proposed land-based construction activities under the Ports North (Cairns Port Authority) Land Use Plan.

### **Marine water quality - operational impacts**

Operational activities that could result in impacts on marine water quality within Trinity Inlet and Trinity Bay include the increased number of large cruise vessels at Trinity Inlet wharves, increases in maintenance dredging of the entrance channel and associated placement of maintenance dredge material.

The project would increase the number of large cruise vessels entering the Trinity Inlet. The majority of additional cruise ships would be subject to international maritime and environmental requirements including the Australian Maritime Safety Authority's *North East Shipping Management Plan*<sup>13</sup> which outlines measures to manage the safety of shipping in the sensitive marine environments of Australia's north-east region. There are potential impacts to water quality from release of shipping-related contaminants (including waste water, antifouling agents, ballast water etc) from increased number of ships. Multiple international standards, Queensland and Australian legislation would apply to all cruise ships and regulate the release of shipping contaminants.

Where these legal requirements are met, the potential for introduced contaminants from increased shipping presents a long-term, minor impact compared to the current situation. Mitigation of these potential impacts will be addressed by compliance with standards and legislation, and implementation of the port's Environmental Management System for operational activities.

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<sup>13</sup> Australian Maritime Safety Authority, 2014, <https://www.amsa.gov.au/north-east-shipping-management-plan>

## Marine sediment quality

### Capital dredging and port upgrade construction impacts and mitigation measures

Marine sediments may be directly disturbed by dredging activities and movement of the dredge itself. There is also potential for minor disturbance due to other construction activities, particularly pile driving for port upgrades.

Sediment sampling and analysis results from inner port and outer channel sites indicate that all potential contaminants of concern in capital dredge material (i.e. metals and organic contaminants) were below the relevant NAGD screening levels, with the exception of total mercury concentrations. Elutriate and bioavailable concentrations of total mercury were below relevant ANZECC/ARMCANZ (2000) default marine water quality guidelines<sup>14</sup> and NAGD screening levels, respectively. Therefore, it is unlikely that concentrations of contaminants of concern released during dredging would pose any significant risk to the surrounding marine environment. This assessment is consistent with results of annual maintenance dredging sediment sampling and analysis findings that the material to be suitable for unconfined marine placement between 1995 and 2016.

To address the potential risk to marine sediment quality associated with disturbance of PASS material, the DMP provided within the EIS documentation identifies that if dredge material is required to be stored in barges for longer than 24 hours (e.g. in case of vessel breakdown) and there is increased risk of oxidation, material is to be tested for acid sulfate soil (ASS) and treated (if necessary) prior to placement at the Tingira Street DMPA.

### Operational impacts on marine sediment quality

The key operational activities that could potentially impact on marine sediment quality within Trinity Inlet and Trinity Bay include the increased number of large cruise vessels at Trinity Inlet wharves, a two to six per cent increase in maintenance dredging of the entrance channel and associated placement of maintenance dredge material at the existing offshore Cairns Port DMPA.

Modelled impacts predict negligible operational impact on marine sediment quality, which would be addressed via implementation of the port's Environmental Management System for port operational activities.

## Coastal processes

Hydrodynamic modelling results presented in the EIS documentation identify that capital dredging may impact tidal currents in the immediate vicinity of dredging activities, particularly associated with increasing the flow capacity of the shipping channel. Analysis of modelling results identified:

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<sup>14</sup> <http://www.agriculture.gov.au/water/quality/guidelines/volume-1>

- barely discernible differences for velocity impact and depth-averaged velocity due to the project, even under relatively large spring tide conditions
- changes to tidal current velocity is predicted to have negligible impact on seagrass or benthic habitats
- negligible changes to water levels due to changes in tidal flow patterns
- no discernible difference in storm time level between base case and developed case
- no substantial change to flood plumes due to project activities
- very minor (<1 cm) impacts on wave heights, with no significant impact predicted on nearshore wave conditions driving littoral and beach system processes.

The low to negligible predicted impacts on coastal processes do not necessitate any specific mitigation or management measures.

As previously discussed, increased siltation of the channel will require a two to six per cent increase in maintenance dredging of the entrance channel and placement of dredged material at the existing offshore Cairns Port DMPA. Management of potential impacts associated with placement of maintenance dredge material will be regulated through existing approvals for placement of maintenance dredge material at the existing offshore Cairns Port DMPA.

### **Cumulative dredging impacts**

The EIS documentation reported the potential for cumulative impacts on marine water quality if capital and maintenance dredging activities were to occur in succession. This is considered likely, as maintenance dredging immediately prior to capital dredging would minimise the amount of dredged material to be placed in the Northern Sands DMPA void.

The cumulative assessment presented in EIS documentation concluded that any residual turbidity from maintenance dredging still in the system when capital dredging commences would be relatively insignificant. Therefore, the potential cumulative impacts on water quality are predicted to be similar to impacts due to capital dredging only, as considered in previous sections. Management and mitigation measures proposed to protect marine water quality during the capital dredging campaign will provide for any measures necessary to address potential cumulative impacts.

### **5.3.4 Coordinator-General's conclusion: Marine and coastal environment**

I am satisfied the proponent has assessed the potential impacts on the marine and coastal environment from the proposed capital dredging and port upgrades. The assessment predicted that short-term (12 weeks), minor impacts are expected to result from turbid plumes generated from capital dredging within the inner port area. When compared to existing turbidity conditions, the capital dredging would increase turbidity values at most locations by less than seven per cent for the duration of dredging. A zone of low to moderate impact is predicted to extend approximately 2 km southwards along Trinity Inlet and approximately 2 km northwards adjacent to the channel. No

zones of high impact are predicted occur within the inner port area outside the dredge footprint.

The assessment found that sediment sampling and analysis results from inner port and outer channel sites indicate that all potential contaminants of concern in capital dredge material (i.e. metals and organic contaminants) were below the relevant NAGD screening levels, with the exception of total mercury concentrations. The assessment also predicted that there are no expected water quality impacts associated with PASS for the capital dredging activities.

I consider that potential impacts on the marine and coastal environment are unlikely to result in adverse impacts to the temporary nature of the dredging and construction activities and that they can be managed effectively.

To ensure water quality impacts are managed, I have stated conditions in Appendix 2 that:

- define the extent and duration of capital dredging activities
- set water quality limits and require monitoring at defined sensitive ecological receptor locations
- require a DMP, which is to include a sediment plume-associated monitoring program and a receiving environmental monitoring program

A TAG will be established to oversee dredging works for the project. The TAG would be made up of independent subject matter experts with the responsibility of reviewing data related to water quality and ecosystem health. I have stated conditions for the EA which set requirements for the membership and role of the TAG (Appendix 5). I also have recommended terms of reference for the TAG.

I have stated conditions for the following approvals the proponent is required to obtain prior to commencement of construction:

- Development permit for operational works for tidal works (capital dredging) in Appendix 2
- a Marine Park Permit for dredging in Trinity Inlet in Appendix 3, which will provide protection of values in the General Use Zone of the Great Barrier Reef Coastal Marine Park.

I am satisfied that implementing the DMP, CEMP and proponent commitments will address the potential impacts resulting from capital dredging and construction of port upgrades.

## **5.4 Matters of state environmental significance**

### **5.4.1 Submissions received**

Submissions received on the EIS documentation identified the following key issues relating to impacts on MSES from capital dredging and port upgrades:

- dredging impacts to seagrass and coral reefs

- impacts to dolphins, dugongs and sea turtles from:
  - interactions with dredge machinery and marine vessels
  - underwater noise and vibrations from piling activities
  - artificial lighting.

I have considered all submissions on the EIS documentation in my evaluation of the project.

## **5.4.2 Impacts and mitigation measures**

### **Trinity Inlet declared FHA**

The Trinity Inlet FHA was declared in 1998 with an exclusion area to cater for future expansions of the shipping channel. The proposed shipping channel footprint is not completely within the exclusion area. Approximately 9.21 ha of the proposed channel is in the Trinity Inlet declared FHA. Dredging is not permitted within declared FHAs in accordance with the SDAP state code 12. The proposed dredging activities cannot commence unless the FHA boundaries are amended.

The proposal involves adjusting the current exclusion zone slightly west and converting sections of the current exclusion zone to declared FHA (refer to Figure 5.2). These proposed changes to the exclusions zone would increase the declared FHA by five square metres overall.

Amending FHA boundaries is a legislative process requiring amendment to the Fisheries Regulation 2008. I note that DES (formerly the Department of National Parks, Sport and Racing), as the agency responsible for this amendment, has confirmed general support for the proposed amendment. I am satisfied that the proponent has provided sufficient information to assess the potential changes to the Trinity Inlet declared FHA.





## **Water quality impacts - Trinity Inlet FHA**

Assessment of marine water quality impacts on values of the Trinity Inlet FHA presented in the EIS documentation include:

- low risk of impact to mangroves: predicted impacts on hydrodynamics, sedimentation rates and water quality are not expected to adversely affect mangroves in areas such as Trinity Inlet with rates and deposition levels well within the range of natural variability
- medium potential impact to seagrass, reduced to low risk of impact with mitigation measures: seagrass is not presently found in the dredge footprint; water quality modelling predicts that adjacent seagrass areas are either in the zone of low to moderate impacts (immediately adjacent to the channel) or zone of influence but that dredging turbidity plumes are not expected to adversely impact these areas in terms of turbidity and sedimentation. A RMP will be implemented during the dredging to control impacts to these communities with corrective actions as outlined in Chapter C2 (Dredge Management Plan)
- low risk of impact to soft sediment benthic habitats: unvegetated soft bottom benthic habitats will recover following disturbance by dredging. Recovery will occur progressively but full recovery is not expected for periods of months (e.g. 6 – 24 months) – short to medium term
- low risk of impact to fisheries resources: impacts on fisheries species of significance are not expected other than temporary impacts on fish movement during dredging.

Mitigation and management measures proposed to protect marine water quality from potential capital dredging impacts as discussed in Section 5.3 (Marine and coastal environment) will protect fish habitat values of this FHA.

I consider the risk of impacts from dredging activities to fish habitat values within the Trinity Inlet declared FHA would be low and that proposed measures to protect water quality are adequate to prevent potential impacts to the FHA.

## **Marine plants and coral reefs**

The EIS documentation indicates that capital dredging and port upgrades could potentially affect marine plants including seagrass and benthic communities, and coral reefs.

### **Seagrass**

A total area of 800 ha of seagrass has been previously mapped in and around Cairns, representing the only major seagrass resource between Hinchinbrook Island and Cooktown.

The EIS reported that approximately three hectares of seabed that has previously supported seagrass would be dredged to expand the Trinity Inlet shipping channel. This represents less than one per cent of the total area of historic seagrass habitat in the Cairns region. The EIS indicates this would result in permanent loss of potential seagrass habitat in this location, which represents a significant residual impact to marine plants. Seagrass is also a matter of national environmental significance (MNES)

and impacts would be managed by the Commonwealth Department of the Environment and Energy (DEE). I note that DEE will consider offset conditions for significant residual impacts to MSES.

While seagrass was not present in the proposed dredge footprint during surveys undertaken for the EIS documentation, the proponent has committed to conduct seagrass surveys in the area before applying for downstream approvals to confirm any direct impact to seagrass.

Seagrass may also be affected by changes to marine water quality and sedimentation rates within and adjoining the capital dredge footprint resulting from dredge plumes.

Based on the worst-case scenario and using the zones of impact method, the EIS documentation identified that no zones of high impact on turbidity would occur within the inner port area. A zone of low to moderate turbidity impact is predicted to extend approximately 2 km southwards along Trinity Inlet and approximately 2 km northwards adjacent to the channel. No current or historic seagrass meadows are present within this area. The zone of influence is predicted to extend from the inner port southwards along Trinity Inlet to areas of historical seagrass, however no ecological impacts are considered likely to occur in the zone of impact.

While no current seagrass meadows are present within the predicted zones of impact for sediment deposition, these zones of impact are predicted to extend over some historical seagrass areas, considered to provide potential seagrass habitat. The existing shipping channel includes 6 ha of potential habitat for seagrass, and the proposed expanded channel overlaps an additional 3 ha of potential habitat for seagrass.

I am satisfied with the proponent's commitment to conduct updated seagrass surveys before dredging to confirm whether any seagrass has become established since the EIS that could be directly impacted. To ensure that any impacts to seagrass are adequately managed, I have stated conditions for impacts to marine plants from dredging (Appendix 2), including the provision of offsets for any significant residual impacts. The offset requirements would be finalised following further seagrass surveys, to be submitted as part of the operational works approval for disturbance to marine plants.

### **Benthic communities**

Approximately 34.5 ha of potential benthic communities that have not previously been dredged would be removed during capital dredging and port upgrades. The EIS documentation indicates that, following initial loss of communities, dredging is expected to result in the creation of similar benthic habitat in this newly disturbed area to that found in the existing outer channel and previously dredged inner port, including simplified macroinvertebrate assemblages with lower species diversity. This may be considered a significant residual impact to marine plants and would require an offset under the *Environmental Offsets Act 2014* (EO Act).

Installing piles for mooring and berthing dolphins as part of the port upgrades would damage approximately 53.76 m<sup>2</sup> of potential benthic communities. The inner port is a

highly mobile fine sediment environment and only supports very sparse benthic communities. Therefore, although potential benthic communities would be permanently lost by installing the piles, the fisheries value of these potential communities is considered to be low. This could be a significant residual impact to marine plants and may require an offset under the EO Act. DAF will determine whether offsets are required during subsequent approvals.

I expect the proponent to confirm the direct impact area to benthic communities prior to applying for subsequent approvals. To ensure that potential impacts to benthic communities are managed, I have stated conditions for impacts to marine plants from dredging and port upgrades (Appendix 2). I note that DEE will consider offset conditions for significant residual impacts to MNES that may include benthic communities. The offset requirements would be finalised during the detailed design stage of the project as part of the operational works approval for disturbance to marine plants.

### **Coral reefs**

Modelling presented in the RDEIS predicts changes in sedimentation rates due to deposition of suspended sediments from dredge plumes within and adjoining the capital dredge footprint.

While zones of impact are predicted within and adjacent to the shipping channel, the zones of impact for sediment deposition do not coincide with areas containing coral reefs within the study area. A zone of influence is predicted to extend near to Rocky Island reef during a worst-case scenario, however no ecological impacts are predicted within this zone of influence.

### **Protected wildlife**

The Cairns region, and Trinity Inlet in particular, is a busy shipping area. While protected marine wildlife are sighted in the area, there is no important habitat for them in or near Trinity Inlet. Sighted animals are likely to be transiting through the area.

### **Vessel strike and interaction with dredge machinery**

Inshore dolphins, dugongs and turtles may be injured by interacting with moving vessels and dredgers during construction, operation and decommissioning of the project. Submissions on the EIS documentation raised issues about impacts on marine wildlife during the dredging campaign.

Protected marine wildlife swimming near the water surface could be injured by vessels travelling to and from the Port of Cairns, and marine turtles resting in the Trinity Inlet shipping channel could be injured by interactions with the TSHD during capital dredging. To minimise the risk of vessel strike and prevent potential impacts to marine turtles from dredging the proponent has committed to implement the following measures outlined in the DMP:

- ensuring that vessel masters and spotters are adequately trained in marine mammal and marine turtle interaction procedures

- maintaining a 300 m exclusion zone between the vessel and marine mammals, when they are sighted. In the event that a marine mammal is sighted, vessel speed and direction will be adjusted until the animal has moved further than 300 m or have not been sighted for 15 minutes
- mounting turtle deflectors or chains on the draghead of the TSHD
- activating water jets on the draghead before the dredge pump is started, where practicable
- starting the dredge pump only when the draghead is close to the seafloor, and stopping the dredge pump as soon as possible after completing dredging
- maintaining a lookout for marine wildlife while the dredge operates
- amending dredging operations when marine mammals (except dolphins) and turtles are observed within 300 m of the operating dredge until the wildlife have moved further than 300 m away or have not been sighted for 15 minutes.

The proponent would also ensure that animal sightings and any relevant actions taken will be recorded, and that any incidents involving injured or killed animals will be immediately reported to the relevant regulatory agencies.

I am satisfied that the proposed mitigation measures will prevent potential interactions with marine turtles and the TSHD during dredging.

### **Underwater noise and vibration**

Installing piles for mooring and berthing dolphins as part of the port upgrades would generate underwater noise and vibration that may affect protected marine wildlife. Submissions on the EIS documentation raised issues about underwater noise and vibration impacts to protected marine wildlife.

Underwater noise and vibrations could affect inshore dolphins' echolocation abilities, damage their hearing and deter them from foraging near the piling activities. Hearing damage is only likely to occur to marine mammals that are within ten metres of the piling rig for long periods. To mitigate impacts from underwater noise and vibration, the proponent has committed to implement the following measures listed in the CEMP:

- using a resilient pad (dolly) where feasible between the pile and hammer head to attenuate noise
- adopting a 'soft-start' regime at the start of each day's piling activities to encourage wildlife to move away from the area
- implementing a marine mammal observation zone of one kilometre and an exclusion zone of 100 m during piling activities
- stopping piling activities if marine mammals are spotted within or approaching the exclusion zone.

I consider the proposed mitigation measures will prevent potential impacts to dolphins and other marine animals during pile driving activities at the port.

### **Artificial lighting**

The EIS documentation identified that marine turtles may occasionally nest in the harbour but there are no nesting sites adjacent to the Trinity Inlet shipping channel or

port. Submissions on the EIS documentation raised issues about artificial lighting effects to sea turtles.

Marine turtles could become disoriented due to artificial lighting, particularly during nesting and hatching periods. Marine turtles nesting or hatching in the harbour could be disoriented by light spill from the port and dredging activities. However, given there are no nesting sites adjacent to the Trinity Inlet shipping channel or port and there is only low incidence of turtles nesting in the harbour, the likelihood of any potential impact would be low. To ensure that potential impacts from artificial lighting are minimised, the proponent has committed to use low wattage and/or directional light fixtures. The DMP proposes that light levels from the dredging works will be limited to those lights that are necessary for the safe operation of the vessel and the health and safety of those onboard.

I consider the likelihood of the potential impact to be low, and the proposed mitigation measures to be adequate to manage potential impacts to turtles nesting or hatching in the harbour.

#### **5.4.3 Coordinator-General's conclusion: Matters of state environmental significance**

I am satisfied that the proponent has assessed potential project impacts on MSES. Approximately 9.2 ha of the proposed shipping channel expansion overlaps with the Trinity Inlet declared FHA. The proponent proposes adjusting the boundaries of the FHA which would result in an increase of the FHA by five square metres overall. The assessment predicted that there is unlikely to be an adverse impact on habitat values of the Trinity Inlet declared FHA.

The assessment predicted that inshore dolphins, dugongs and turtles may be injured by interacting with moving vessels and dredge equipment during construction, operation and decommissioning of the project. Further, underwater noise and vibrations could affect inshore dolphins' navigation abilities, damage their hearing and deter them from foraging near the piling activities.

The assessment also predicted that capital dredging and port upgrades could potentially affect marine plants including seagrass and benthic communities, and coral reefs. The dredge footprint could result in the removal of 3 ha of potential seagrass habitat (based on historical records). Water quality modelling in the EIS documentation predicts that seagrass areas adjacent to the dredging footprint are either in the zone of low to moderate impacts (immediately adjacent to the channel) or the zone of influence where no ecological impacts are predicted.

I consider that the proponent's commitments and mitigation measures presented in the DMP and CEMP can manage the project's impacts on MSES. I expect the proponent to confirm the area of seagrass to be dredged prior to applying for subsequent approvals. Any offset requirements for significant residual impacts to matters which are also MNES will be considered by DEE. I have stated a condition for the operational works approval for disturbance to marine plants requiring the proponent to deliver offsets for

any significant residual impacts to MSES under the EO Act which is not considered by DEE to ensure that offset requirements are not duplicated (Appendix 2).

I have stated conditions for potential impacts on marine plants that are to be attached to the Operational Works approval (Appendix 2).

I am satisfied that the stated conditions, proponent commitments and mitigation measures outlined in the EIS documentation would ensure the potential impacts on MSES as a result of capital dredging and wharf upgrades are appropriately managed.

## 5.5 Queensland cultural heritage

Impacts to Queensland cultural heritage from capital dredging and port upgrades was not a key issue raised in submissions received on the EIS documentation. I acknowledge the potential for Queensland cultural heritage impacts and have considered them in the assessment below.

### 5.5.1 Impacts and mitigation measures

#### Cairns Wharf Complex

The assessment of project impacts to the Cairns Wharf Complex is included at Section 8.2.6 (state code 14: Queensland Heritage). I note that the proponent is required to submit a development application for works on the state heritage place that should include a detailed description of the proposed development, a heritage impact statement and additional information addressing specific technical issues and relevant mitigation measures in a conservation management plan. I am satisfied that the proposed port upgrades, included wharf upgrades, described in the EIS documentation are consistent with the performance outcomes of state code 14.

#### Malay Town

Port upgrades may uncover archaeological artefacts relating to Malay Town. The proponent has committed to engage a suitably qualified archaeologist to monitor excavations in the vicinity of the Malay Town site to address recovery, protection and, if required, documentation of archaeological artefacts, features and deposits that may be uncovered.

I consider the proposed measure to be appropriate and adequate to mitigate potential impacts to archaeological artefacts relating to Malay Town.

#### Underwater cultural heritage artefacts

Underwater cultural heritage artefacts relating to the *Adieu*, *Mary* and *Miro* shipwrecks could be uncovered or potentially impacted during dredging in the swing basin and Trinity Inlet shipping channel. The EIS documentation did not confirm the presence or location of the shipwrecks or other underwater artefacts.

The proponent has committed to engage a suitably qualified maritime archaeologist to review hydrographic survey data to determine the likelihood of whether maritime



archaeological features are present in the area. The archaeologist will also be engaged to establish the extent of known shipwrecks and prepare a report on the likelihood of the presence of additional wrecks or maritime archaeological features in the project area.

The report would also determine the likelihood of direct and indirect impacts from construction and operation activities on the sites. If impacts are considered likely, mitigation measures should be included in the report.

### **5.5.2 Coordinator-General's conclusion: Queensland cultural heritage**

I am satisfied that the proposed port upgrades, including wharf upgrades, described in the EIS documentation are consistent with the performance outcomes of state code 14. The proponent is required to secure a development approval for the proposed works at the Cairns Wharf Complex from DES prior to construction commencing, which will address impacts to Queensland cultural heritage.

I note that the assessment predicted that port upgrades may uncover archaeological artefacts relating to Malay Town, and underwater cultural heritage artefacts relating to the *Adieu*, *Mary* and *Miro* shipwrecks. These artefacts could be uncovered or potentially impacted during dredging in the swing basin and Trinity Inlet shipping channel.

I consider the proponent's proposed measures to mitigate potential impacts to artefacts relating to Malay Town and underwater cultural heritage artefacts to be appropriate.

I expect the proponent to ensure that any archaeological investigations are conducted in accordance with DES's archaeological guidelines and any uncovered archaeological artefacts are notified to DES.

I am satisfied that the mitigation measures identified in the EIS documentation would ensure that potential impacts to Queensland cultural heritage are managed appropriately.

## **5.6 Aboriginal and Torres Strait Islander cultural heritage**

Impacts to indigenous cultural heritage from capital dredging and port upgrades was not a key issue raised in submissions received on the EIS documentation. I acknowledge the potential for indigenous cultural heritage impacts and have considered them in the assessment below.

### **5.6.1 Impacts and mitigation measures**

#### **Story places**

Story places significant to the Gimuy Walubara Yidinji people may be impacted by dredging activities and port upgrades.

The proponent would be required to develop a CHMP with the Gimuy Walubara Yidinji people to manage potential impacts to the story places within the shipping channel and the wharf.

### **5.6.2 Coordinator-General's conclusion: Aboriginal and Torres Strait Islander cultural heritage**

I am satisfied that the EIS documentation has adequately investigated and assessed the potential impacts of the project on Aboriginal and Torres Strait Islander cultural heritage. I note that the assessment predicted that story places significant to the Gimuy Walubara Yidinji people may be impacted by dredging activities and port upgrades.

I note that the proponent has started engaging with the relevant Aboriginal and Torres Strait Islander parties and will develop CHMPs with each affected party. I am satisfied that engagement activities commenced by the proponent would assist in the development of CHMPs to address the potential impacts to Aboriginal and Torres Strait Islander cultural heritage as a result of capital dredging and wharf upgrades.

## **5.7 Maritime transport**

### **5.7.1 Submissions received**

Submissions received on the EIS documentation identified pilotage and captains unfamiliar with channel navigation within the port limits as a key issue relating to impacts on maritime transport as a result of capital dredging and port upgrade activities. I have considered all submissions on the EIS documentation in my evaluation of the project.

### **5.7.2 Impacts and mitigation measures**

#### **Construction**

The dredging program would involve the removal of 1 000 000 m<sup>3</sup> of in-situ sediment material for onshore placement including:

- soft clay drawn via TSHD dredge
- stiff clay materials via BHD dredge, transporting to Tingira Street DMPA utilising a tug boat.

Both dredgers are proposed to operate seven days a week with 24-hour operations.

Dredging activities would generate vessel traffic in the inner port and may impact on vessel safety and navigation of other traffic such as commercial shipping vessels, tug boats, pilot boats, navy vessels, and fishing and recreation vessels. Dredging activities could also increase the likelihood of collisions, delays, congestion and interfere with scheduled shipping movements.

Potential maritime transport impacts in the existing port navigation areas during the pre-construction and construction phases include:

- ship collisions or groundings
- discharge of general and hazardous waste generated from dredging activities
- oil and fuel spills from dredges.

The proponent is responsible for maintaining navigable port depths, port facilities and port operations while vessels are alongside its facilities. Ports North's Marine Pilots undertake the pilotage of all cruise ship transits of the Cairns Shipping Channel, berthing arrivals and departures.

The EIS documentation reported that concurrent movement of shipping within the channel and inner port during the project's dredging activities would be managed through communication between vessel operators and Maritime Safety Queensland (MSQ). There are currently procedures in place at the Port where shipping movements, dependent on size and movement requirements, are managed to allow optimisation of channel and inner port use.

To assist in managing potential vessel interaction impacts, the proponent would:

- prepare and implement a vessel traffic management plan to manage potential marine traffic and safety issues from vessel operations
- consult with MSQ, the Regional Harbour Master and other relevant advisory agencies with the development of the vessel traffic management plan (VTMP)
- include in the VTMP the implementation of measures designed to ensure the safe movement of dredgers and vessels during the dredging program. The VTMP would be added to existing Port operational procedures.

I am satisfied that the mitigation measures proposed by the proponent would ensure that all vessel traffic can be effectively managed through the VTMP during these phases.

I have stated a condition requiring the proponent to develop and implement a VTMP and such plan to be in place approved prior to the commencement of the dredging program (Appendix 2).

Once the dredging program commences, the general safety and management of vessel traffic would be controlled under Standard for Marine Construction Activities within Cairns Harbour by the Harbour Master's direction under section 86 of the *Transport Operations (Marine Safety) Act 1994*.

The proposed capital dredging activities will be required to undertaken in accordance with Port Procedures and Information for Shipping for Port of Cairns under the guidance of MSQ.

### **Maritime transport**

Construction of the port upgrade is likely to precede the dredging program. Existing navigation aids would be required to be relocated as part of the project and additionally new navigation aids would be installed. Marker buoys would also be required to demarcate the Crystal and Smiths Creek swing basins.

To allow larger cruise ships to berth additional independent structures would need to be incorporated into the wharves. With the projected increase in ship arrivals, Wharf 6 would be rebuilt to allow for berthing of two mega class ships simultaneously. This would include the installation of a new independent berthing and mooring structures.

The port upgrade works at the terminal and the installation and or removal of navigation aids would require the following marine vessels:

- pile driving barge
- barge to deliver piling and construction material
- ancillary work boat to reposition the barge
- ancillary small vessel for transport of personnel.

The activities involved with the deployment of marine equipment and vessels associated with the construction of the wharf upgrade and navigational aid installation works would have a duration of six to eight months during the pre-construction, construction and decommissioning phases.

The EIS documentation also assessed the safety risks associated with movement of cruise ships and navigational hazards associated with the project.

As outlined above, with the concurrent movement of shipping within the inner port during the project's port upgrade and navigational aid installation activities would be managed through communication between vessel masters and MSQ.

The proponent proposes to ensure safety, efficiency and environmental objectives are achieved for the movement and navigation of vessels through a VTMP that would be developed in consultation with MSQ, the Regional Harbour Master (RHM) and other relevant advisory agencies.

I have stated a condition requiring the proponent to consult with RHM in determining necessary maritime infrastructure mitigation measures and the development and approval of an Aids to Navigation plan prior to the commencement of project construction (Appendix 2). In conjunction with this recommendation, the proponent may be required to enter into a maritime infrastructure agreement that would be approved by the RHM and MSQ.

## **Operation – Port**

### **Maritime transport**

The EIS documentation indicated that increased shipping activities and movements could increase the likelihood of collisions, delays, congestion, and grounding all port operations.

There are procedures for the safe passage and handling of vessel traffic management controls and actions for the Port currently in place. The EIS documentation notes that there would be no change to anchorage procedures for operational vessels and no update to current procedures.

A submission on the EIS requested the proponent provide further information on pilotage procedures and that information be made available for international cruise ships.

The EIS documentation also notes that pilotage areas fall under the control of the MSQ through the authority of the RHM. The proponent, in consultation with the RHM and MSQ would update the project's pilotage and navigational safety requirements in accordance with RHM and MSQ guidelines. The Cairns MSQ currently provides this information within its *Port Procedures and Information for Shipping for the Port of Cairns* policy.<sup>15</sup>

Management plans involving maritime safety, vessel traffic and navigation will be required to be prepared and reviewed by the RHM prior to commencement of the project. The proponent has prepared a maritime operations management plan (MOMP) to manage such impacts. The MOMP outlines mitigation measures required to manage the environment, vessel safety, navigation and operational efficiency of the port.

The proponent has committed to implement a MOMP and working with the RHM and MSQ to ensure all relevant management plans are regularly audited.

I am satisfied that the mitigation measures proposed by the proponent would ensure that all operational vessel traffic can be effectively managed. To ensure this, I have stated a condition requiring the proponent to consult with MSQ to develop mitigation strategies and operational management plans for shipping safety and traffic impacts of the project (Appendix 2).

### 5.7.3 Coordinator-General's conclusion: Maritime transport

#### Construction

I am satisfied that the EIS documentation appropriately considered the potential maritime transport impacts associated with the capital dredging activities and all maritime traffic and safety matters for the project. The assessment predicted that dredging activities would generate vessel traffic in the inner port and may impact on vessel safety and navigation of other traffic such as commercial shipping vessels, tug boats, pilot boats, navy vessels, and fishing and recreational vessels.

In order to ensure dredging activities are managed to avoid impacts to vessel traffic and safety, I have recommended a condition requiring the proponent to consult with DTMR to discuss the mitigation of vessel safety and traffic impacts of the project.

I have recommended a condition requiring the proponent to prepare and implement a VTMP and an Aids to Navigation Management plan that outlines mitigation and management measures. These measures are designed to reduce impacts from the project's dredging, navigation and port upgrade activities and are to be reviewed and approved by MSQ, prior to the commencement of the project.

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<sup>15</sup> <https://www.msq.qld.gov.au/Shipping/Port-procedures/Port-procedures-cairns>



## Port operations

I am satisfied that the proponent has assessed potential impacts on safety and shipping traffic efficiency within the Port of Cairns. The assessment predicted that increased shipping activities and movements by 103 cruise ships by 2031 could increase the likelihood of collisions, delays, congestion, and grounding of port operations.

With regard to potential impacts of pilotage and navigation procedures, I note that management plans will be in place during all phases of the project to address this issue. A VTMP and a MOMP would be added to existing management plans that are regularly audited by the proponent. I am satisfied that these management plans would address the issue of pilotage procedures and vessel management in navigation areas.

I have recommended a condition requiring the proponent to develop and implement management plans involving maritime safety, vessel traffic and navigation in consultation with the RHM and MSQ.

I am satisfied that this would address the need for managing vessel traffic and safety and ensure that the requirements of the *Transport Operations (Maritime Safety) Act 1994* are met.

## 5.8 Noise and vibration

Impacts to noise and vibration from capital dredging and port upgrades was not a key issue raised in submissions received on the EIS documentation. I acknowledge the potential for noise and vibration impacts and have considered them in the assessment below.

### 5.8.1 Methodology

#### Noise

The proponent conducted background noise monitoring at apartments and hotels located approximately 100 m from the proposed construction worksite and within the Trinity Inlet shipping channel. Data was gathered in accordance with the DES Noise Measurement Manual (2013).

In the absence of Queensland construction noise criteria, the NSW Department of Environment and Climate Change 'Interim Construction Noise Guideline' (2009) (ICNG) was used to develop noise level targets for the project. The ICNG recommends management levels for noise at residences and how they are to be applied, including the highly noise affected level (75 dB(A)) above which there may be strong community reaction to noise.

The assessment considered a best-case and worst-case scenario, where the best case assumes wind speeds of zero metres per second with 60 per cent humidity, while the worst case assumes wind speeds of two metres per second with 80 per cent humidity. The worst-case scenario is representative of a conservative assessment with potential impacts likely to be lower than predicted. Where construction works are proposed to

occur 24 hours per day, seven days per week, the assessment focussed on compliance with the more stringent night-time noise goals.

Underwater noise impacts from the construction of the project are discussed in Section 5.4 (MSES).

The TSHD noise assessment did not consider residential boat moorings as part of the assessment, based on the premise that Ports North would control the use of the moorings to limit the potential for construction noise impacts to those sensitive receptors.

## Vibration

The impact of vibration on human comfort was assessed by applying the vibration impact criteria recommended by the NSW Department of Environment and Conservation's 'Assessing vibration: A technical guideline 2006' and British Standard (BS) 5228.2 Code of Practice for noise and vibration control on construction and open sites (2009). The impact of vibration on buildings was assessed using German Standard (DIN) 4150:3 Structural vibration - Effects of vibration on structures (1986). The vibration impact criteria applied in the assessment are summarised in Table 5.3.

**Table 5.3**      **Vibration impact criteria – human comfort (Source: Draft EIS Chapter B10)**

Impact category	Peak particle velocity (PPV) (mm/s)	Subjective impact
Negligible	$PPV \leq 0.3$	Just perceptible
Minor	$0.3 < PPV \leq 1.0$	Perceptible, potential for complaint
Moderate	$1.0 < PPV \leq 10$	Complaints likely
Major	$PPV > 10$	Vibration likely intolerable

## 5.8.2 Impacts and mitigation measures

### Construction

#### TSHD dredging

TSHD dredging is proposed to occur 24 hours per day, seven days per week for 12 weeks. Noise would be generated through the operation of the dredger and the movement of dredge material to the offshore pump-out area.

In the absence of mitigation measures, the assessment predicted that during standard construction hours (6.30 am to 6.30 pm, Monday to Saturday), noise levels produced by the TSHD may be above the noise level target of 62 dB(A) for the majority of TSHD works. However, the assessment noted that the TSHD would be highly mobile within the channel and unlikely to result in noise exposure at any single receptor for an extended period of time. If the TSHD works are undertaken outside of standard construction hours, moored sensitive receptors located in the Trinity Inlet shipping channel would experience noise levels above the evening and night time noise level targets of 55 dB(A) and 52 dB(A) respectively.

Should the TSHD remain in the vicinity of a sensitive receptor for more than one month, the expected noise impact outside of standard construction hours would increase to 'moderate', where noise above the 'highly noise affected level' of 75 dB(A) may be experienced at sensitive receptors.

In order to manage the potential impacts from the operation of the TSHD for both construction and operations, the proponent proposes that dredging would be scheduled to avoid dredging within Trinity Inlet shipping channel in the vicinity of sensitive receptors outside of standard construction hours wherever possible.

However, should scheduling constraints prove infeasible, potentially affected sensitive receptors would be consulted and the proposed mitigation measures reviewed based on this consultation. Ports North have also indicated that the use of the boat moorings as residences during the construction of the project may be limited, to prevent the potential for noise impacts.

The proponent has committed to consulting with the moored sensitive receptors near construction areas to manage the potential impacts associated with TSHD dredging.

### *Vibration*

The assessment predicts that vibration from dredging would be below 0.1 mm/s for all sensitive receptors. This is well below vibration impact criteria for all sensitive receptor types and is considered to be a 'negligible' impact.

### **Backhoe dredging**

Works requiring the backhoe dredger are proposed to be undertaken 24 hours per day, seven days per week for five weeks. Noise would be generated by the backhoe machinery during the excavation of sediments from the seabed.

Without mitigation, backhoe dredging is predicted to result in 'minor' noise impacts to all sensitive receptors (including closest sensitive receptors located approximately 100 m away along Wharf Street and within the Trinity Inlet shipping channel) during standard construction hours. Should dredging be undertaken in the vicinity of the Wharf Street waterfront outside of standard construction hours, it is predicted that there would be 'high' noise impacts and the potential for sleep disturbance to sensitive receptors located along Wharf Street and within the Trinity Inlet shipping channel.

The proponent has identified the following mitigation measures to address the identified backhoe dredging noise impacts:

- should scheduling constraints (avoidance of works during night time hours) for backhoe dredging prove infeasible, affected residents would be consulted about potential mitigation measures
- all works to be undertaken in accordance with Australian Standard (AS) 2436 Guide to noise and vibration control on construction, demolition and maintenance sites (2010)
- preparation of a construction noise and vibration management plan which would detail noise mitigation measures agreed in consultation with DES or CRC.

The proponent has also committed to avoid backhoe dredging in the immediate vicinity of the Wharf Street waterfront outside of standard construction hours.

### **Port upgrades**

Wharf construction associated with port upgrades is proposed to be undertaken over 12 months, and would be limited to occurring only within the standard construction hours of 6.30 am to 6.30 pm, Monday to Saturday. Minor works unlikely to result in significant noise may be undertaken outside of standard working hours.

The greatest noise impact would be generated through driving the 84 racking steel piles required for the reconstruction of wharf 6. The potentially worst affected sensitive receptors would be the residential apartments and hotels located on Wharf Street and the moored residences within the Trinity Inlet shipping channel.

The assessment predicted that without mitigation measures, piling noise would generate noise above the relevant daytime construction noise target by 5 dB(A). If works are undertaken during the night-time period, piling would generate noise above the relevant night-time noise target by 15 dB(A). The assessment concluded that piling would result in 'minor' noise impacts to sensitive receptors when undertaken during standard construction hours. If piling is to be undertaken outside of standard construction hours, the level of impact would increase to 'high' at Wharf Street sensitive receptors and 'moderate' for Trinity Inlet sensitive receptors, and may result in sleep disturbance impacts.

The following mitigation measures are proposed in the CEMP to address the potential piling noise and vibration impacts:

- if night time works are required, residents will be consulted to explore mitigation options including:
  - monitoring of noise generated by piling works, to identify when noise may be above the relevant noise targets and further mitigation is required
  - respite periods and shutting down of intermittently used machinery
  - temporary alternative accommodation if night works occur over an extended period
  - piling 'soft start' procedures
  - regular maintenance of vehicles and machinery and muffling devices
- use of a resilient pad where feasible between the pile and hammer, to reduce airborne noise impacts, in accordance with British Standard (BS) 5228 Code of practice for noise and vibration control on construction and open sites (2009)
- limiting the hammer energy used to undertake piling, based on the distance to nearest sensitive receptors and structures
- contractor review of existing dilapidation surveys for heritage wharf during planning of and prior to commencement of construction, and adjust construction program accordingly
- notifying potentially affected residents of any out-of-hours construction works

- vibration monitoring on the first day of piling to confirm and calibrate the vibration predictions and development of vibration criteria to avoid damage to the heritage-listed wharf.

The proponent has committed to limiting piling activities to standard construction hours, unless approval is obtained from DES or CRC to justify construction works outside 6:30 am to 6:30 pm.

### *IFO pipeline*

The construction of the Intermediate Fuel Oil (IFO) pipeline is expected to take over one month and would be undertaken only during standard construction hours. The assessment predicts that the construction of the IFO pipeline would comply with construction noise level targets at sensitive receptors near the wharf construction area.

### *Vibration*

The EIS documentation notes that vibration levels from piling are dependent on the hammer energy, which is related to the hammer mass and drop height. For typical hammer energies, the assessment predicts that vibration would be experienced as a 'minor' impact at Wharf Street residential receptors, within the range of 0.3 PPV to 1.0 PPV for the duration of piling (over one month). The EIS documentation notes that human comfort vibration impacts may be experienced if vibration levels exceed 0.3 mm/s PPV.

To manage potential impacts to the heritage wharf, the piling hammer energy would be controlled and reduced as the piling rig approaches the wharf. This is expected to result in a 'negligible' impact. Further, the proponent would also set vibration criteria for piling activities to avoid heritage damage to the wharf.

## **Operations**

Operational noise sources would include noise generated by:

- ship propulsion engines, berthing motors, auxiliary engines and ventilation systems
- docking, loading and unloading of ships, including refuelling
- use of ship PA systems.

### **Shipping noise**

The Port of Cairns operates 24 hours per day, seven days per week. Although the project would not introduce a new noise source, the amount of operational noise generated would increase as a result of the expansion.

The assessment considered typical noise emissions likely to be produced by various sizes of cruise ships during the project's operational phase, and the associated impacts at the nearest sensitive receptors which include the apartments and hotels located approximately 100 m from the wharf. Table 5.4 provides the noise criteria adopted for the assessment of operational noise for the project.



**Table 5.4 Planning level noise criteria for operational noise (Source: RDEIS Appendix AU)**

Time period	Background level (RBL L <sub>90</sub> (1 hour) <sup>16</sup> dB(A))	EPP (Noise) objective L <sub>Aeq,adj,1hr</sub> <sup>17</sup> dB(A)	Calculated external noise limit L <sub>eq</sub> (1 hour) dB(A)
Day	54	35	42 – doors/windows open 55 – doors/windows closed
Evening	48	35	42 – doors/windows open 55 – doors/windows closed
Night	46	30	37 – doors/windows open 50 – doors/windows closed

Existing worst-case operational noise assessments were based on noise likely to be generated by the *Rhapsody of the Seas*, the largest ship that currently accesses the Port of Cairns. During worst-case conditions and without mitigation, *Rhapsody of the Seas* could produce noise emissions up to 55 L<sub>eq</sub>dB(A), which is above the night time EPP(Noise) objective by 25 dB(A). The assessment found that operational noise above the EPP(Noise) objectives is likely to be produced during best-case conditions by up to 24 dB(A).

The assessment predicts that during operations, without mitigation and during worst-case conditions, noise generated by medium sized ships would be above the night-time EPP(Noise) objective by up to 23 dB(A). Large ships were also predicted to generate noise above the objectives by up to 25 dB(A) during worst-case conditions, an impact consistent with existing operations. Similar noise levels above the noise objectives are predicted for both medium and large ships during best-case conditions.

However, when taking into account the noise attenuation that could be provided (20 dB(A)) if doors and/or windows are closed in surrounding properties, medium and large ships would only generate noise above the night-time EPP(Noise) objectives by up to 3 dB(A) and 5 dB(A) respectively during worst-case conditions.

Ports North indicated that to date, no noise complaints have been received during visits by *Rhapsody of the Seas*. In conclusion, the assessment stated that cruise ship transits would not occur at night, would be discrete sound events and therefore noise levels above the noise objectives are unlikely to occur and can be considered low-risk.

Should operational noise impacts occur, mitigation measures to reduce operational shipping noise impacts may include:

- avoiding running the ships primary propulsion engines at night (between 10:00 pm and 6:00 am)
- avoiding conducting loading/unloading activities or refuelling at night
- avoiding the use of the ships external PA system at night.

<sup>16</sup> Noise level exceeded for 90% of the 1 hour period.

<sup>17</sup> Equivalent continuous sound level across a 1 hour period, adjusted for tonality or impulsiveness.

If ships berthed at the Port of Cairns need to conduct noise generating activities at night, the proponent may update their operational procedures to require ship operators to provide advance notice of their intention to do so. The proponent may then implement additional management measures, such as notification of surrounding residents of potentially noisy night time activities, and direct residents to details of the Port's complaints handling procedure.

### **5.8.3 Coordinator-General's conclusion: Noise and vibration**

I am satisfied with the assessment of construction and operation noise and vibration impacts for the capital dredging and port upgrades. The proponent has committed to preparing a construction noise and vibration management plan for specific project areas, which would include the mitigation measures outlined in the EIS documentation. I expect the proponent to implement the mitigation measures outlined within the EIS documentation for each construction and operational activity.

#### **Construction**

##### **Dredging**

The proponent has committed to consult with the moored sensitive receptors located in Trinity Inlet and at Wharf Street waterfront near project activities to manage the potential impacts. I have imposed a condition (refer Appendix 1) requiring the proponent to ensure that impact mitigation strategies are updated in response to feedback from sensitive receptors. I note that the proponent has committed to avoid backhoe dredging in the immediate vicinity of the Wharf Street waterfront during night time hours, and I expect them to fulfil this commitment. I have stated conditions in Appendix 2 for the EA setting noise limits and requirements for noise monitoring to ensure that noise associated with capital dredging is managed to avoid nuisance at sensitive receptors.

##### **Port upgrades**

I note that noise levels 5 dB(A) and 15 dB(A) above the day-time and night-time noise targets are expected for the temporary works associated with port upgrades. I also note that vibration levels are predicted within the range of 0.3 PPV to 1.0 PPV for the duration of piling, and that human comfort vibration impacts may be experienced if vibration levels are above 0.3 mm/s PPV.

The proponent has committed to limiting piling activities to standard construction hours. I am satisfied that this would ensure that the potential for sleep disturbance impacts from piling activities is avoided, and I expect that the proponent fulfils this commitment.

Noise and vibration generated through construction works associated with the port upgrades will be addressed and managed through future development applications made by the proponent under the *Planning Act 2016*.

I have imposed a condition in Appendix 1 requiring the proponent to ensure that impact mitigation strategies are implemented in response to feedback from sensitive receptors. I am satisfied that through the conditions, proponent commitments,

proposed temporary construction works schedule and the mitigation measures identified, the potential for impacts to human health and wellbeing from piling noise and vibration can be managed.

## Operations

### Shipping noise

I acknowledge that the Port of Cairns operates 24 hours per day, seven days per week, 365 days per year. I note that the identified sensitive receptors are already exposed to high levels of noise due to their proximity to the port and surrounding industrial areas. Further, I note that the assessment indicated that existing port operations exceed the night-time EPP (Noise) objective, and that no complaints have been received regarding noise produced by large ships when at berth.

I am satisfied that the assessment has predicted the potential operational noise and vibration impacts for the project. I expect that the proponent implements the mitigation measures outlined above to address any potential impacts from increased shipping noise, as a minimum, as part of their existing MOMP.

I have imposed a condition in Appendix 1 requiring the proponent to ensure that impact mitigation strategies are implemented in response to feedback from sensitive receptors. I am satisfied that if complaints are received in relation to shipping noise, this condition would ensure that the impacts are managed.

I am satisfied that the imposed conditions and amendments to the MOMP can manage potential operational shipping noise impacts.

## 5.9 Air quality

### 5.9.1 Submissions received

Submissions received on the EIS documentation identified the following key issues related to air quality matters:

- need for the proponent to undertake baseline air quality monitoring for the project
- need for the proponent to undertake monitoring of nitrogen dioxide (NO<sub>2</sub>) and fine particles (PM<sub>2.5</sub>) at the Wharf Street apartments as proposed in the revised EIS as soon as possible
- the proponent should implement air quality mitigation measures identified in the EIS documentation
- whether the assumptions used in the air quality modelling are correct/justified based on current port operations
- deficiencies in the air dispersion model methodology and air dispersion model
- the requirement for ships to use low sulphur fuel (0.5%) from 2020 when in port
- increased risks of air pollution associated with increased visitation to the Port of Cairns

I have considered all submissions on the EIS documentation in my evaluation of the project.

### **5.9.2 Methodology**

The EIS documentation adopted baseline air quality values for pollutants based on a review of baseline monitoring undertaken for projects in similar locations. Data obtained from air quality monitoring stations located at Earlville (Cairns), Pimlico (Townsville), Gladstone Memorial Park, South Gladstone and Toowoomba was used.

In order to simulate the impacts from construction and operational activities, dispersion modelling software California Puff Model (CALPUFF) was used to predict pollutant concentrations and dust deposition at the nearest sensitive receptors.

The Air Pollution Model (TAPM) was used to generate broad scale meteorological inputs to inform CALPUFF modelling. TAPM used wind speed and direction monitored at Cairns Airport. Cairns has winds predominately from the south-east. TAPM input meteorology was enhanced using Calmet, the meteorological pre-processor to CALPUFF.

The emission rates entered into the dispersion modelling are based on the source and activities scheduled to be undertaken during construction provided by the proponent. The EIS documentation predicted baseline air quality values for pollutants from cruise ships. To estimate air quality impacts associated with the operation of the Port of Cairns, the EIS forecast medium and high projections of annual increases in cruise ships following project completion for 2018 and 2028.

Submissions received on the EIS documentation raised issues regarding deficiencies in the air dispersion model methodology and air dispersion model. In particular, dust and odour generated by the project was not modelled. I am satisfied the air quality assessment presented in the EIS documentation adequately addresses these submissions and provides assessment of air quality impacts.

### **5.9.3 Sensitive receptors**

Sensitive receptors are associated with what is defined as a sensitive land use under the Planning Regulation 2017.<sup>18</sup> These include amongst others: dwellings (boats, apartments, houses), hotels and community centres.

#### **Capital dredging**

There are three sensitive receptors adjacent to the shipping channel. These include hotels and an apartment. The EIS identified the nearest sensitive receptor as sensitive receptor (SR) F, Cairns Hilton Hotel, located approximately 80 m west of the shipping channel.

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<sup>18</sup> Planning Regulation 2017, Schedule 24.

## Port upgrades

There are five sensitive receptors near the port upgrade area. The EIS documentation identified the nearest sensitive receptor as SR E, the Pullman Reef Hotel and Casino, located approximately 100 m west of the proposed port upgrade area. The remaining sensitive receptors are hotels and apartments, each located approximately 180 m west of the port upgrade area.

Moored boats are used as dwellings on the east side of Trinity Inlet and are considered a sensitive receptor. The distances of these boats from project activities vary, with the nearest boat located approximately 395 m from port upgrade activities.

## 5.9.4 Impacts and mitigation measures

### Pre-construction and construction impacts

The EIS documentation stated dredging is proposed to be undertaken 24 hours per day, seven days per week for 12 weeks, unless noise restrictions apply.

The EIS documentation stated that construction of port upgrades would be undertaken between 6.30am and 6.30pm, Monday to Saturday and would take an estimated seven to eight months intermittently over a year. Upgrades to existing water mains, firefighting equipment, installation of a sewage pump station and installation of an additional fuel storage tank would be undertaken concurrently with port upgrades.

Sources of air pollutants from these activities include:

- exhaust emissions from the Trailing Suction Hopper Dredger (TSHD) moving progressively up and down the shipping channel dredging soft clay, then motoring to the pump-out facility
- exhaust emissions from the barge-mounted backhoe excavating stiff clay
- exhaust emissions from the barge motoring to and from the Tingira Street DMPA
- exhaust emissions from construction plant equipment
- dust from vehicle movement on unsealed roads
- dust from exposed soil under high wind conditions from port upgrade activities
- odour from dredge material being exposed to air.

The EIS documentation air quality assessment concluded that potential impacts of unmitigated capital dredging activities and port upgrade activities may result in exceedances of the air quality objectives for PM<sub>2.5</sub>, PM<sub>10</sub>, NO<sub>2</sub> and dust deposition at SR B, SR C, SR D and SR E. These sensitive receptors are hotels and apartments located on the corner of Lake, Wharf and Abbott Streets, approximately between 100 and 130 m west of the port upgrade area. All concentrations of other pollutants are expected to be below the air quality objectives.

I note exceedances for PM<sub>2.5</sub>, PM<sub>10</sub>, NO<sub>2</sub> and dust deposition are likely due to the conservative assumptions applied to the air dispersion model to result in the worst-case scenario.

## **Particulates PM<sub>2.5</sub> and PM<sub>10</sub>**

The model assumes the backhoe dredger used for stiff clay excavation and the associated tugs will use heavy fuel oil<sup>19</sup> and will be constantly emitting relatively close to sensitive receptors. The EIS documentation confirms the backhoe dredger would be close to sensitive receptors for a small portion of the 12-week dredge campaign and the barge transfer will occur intermittently within each day. In addition, the proponent has committed to ensure the backhoe dredger and tugs will use marine diesel fuel<sup>20</sup> to provide a major reduction in particulate and black smoke emissions (PM<sub>2.5</sub> and PM<sub>10</sub>). I am satisfied that with the use of marine diesel fuel and the intermittent nature of project activities, that potential air quality impacts to sensitive receptors can be adequately managed. I support the commitment to use marine diesel fuel, included in this report at Appendix 6, and require it to be undertaken by the proponent.

## **Dust deposition**

Increased dust deposition and particulate emissions may be experienced at the port upgrade area due to vehicle movement on unsealed roads and wind erosion of exposed soil. The EIS predicted the maximum concentration of dust deposition would be 135 mg/m<sup>2</sup>/day, which is above the air quality criteria of 120 mg/m<sup>2</sup>/day. To mitigate these impacts, the proponent has committed to ensure that wharf construction dust management measures are adopted as required to minimise dust generation. The EIS reported the use of water sprays is efficient at mitigating 75 per cent of dust produced. I support this commitment and require it to be undertaken by the proponent.

## **Nitrogen dioxide**

The air dispersion model assumes the excavator and crane used for port upgrades are constantly emitting emissions from 7am to 7pm Monday to Saturday; and selective catalytic reduction (SCR) emission controls for nitrogen oxides (NO<sub>x</sub>) were not fitted. Nitrogen oxides refers to nitrogen monoxide (NO) and nitrogen dioxide (NO<sub>2</sub>). To mitigate potential NO<sub>2</sub> exceedances, the proponent has committed to ensure that mobile cranes are to be fitted with SCR emission control technology. The EIS states SCR emission controls typically reduce NO<sub>x</sub> emissions by 90 per cent. With the application of SCR emission controls, the nearby sensitive receptor would experience 61 µg/m<sup>3</sup> of NO<sub>2</sub>, which is well within the air quality criteria. I support the commitment to implement SCR emission controls and require it to be undertaken by the proponent.

Submissions received on the EIS documentation raised issues regarding the need for the proponent to undertake baseline air quality monitoring, in particular monitoring of NO<sub>2</sub> and fine particles (PM<sub>2.5</sub>) at the Wharf Street apartments as proposed in the EIS documentation as soon as possible. To address these submissions, the proponent has committed to conduct a baseline air quality assessment (including cruise shipping at berth and a location representative of the apartments on Wharf Street between Lake and Abbott Streets) and re-run the air quality dispersion model. This will include a

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<sup>19</sup> The International Organization for Standardization 8217:2017 divides marine fuels into distillate fuels and residual fuels. Heavy fuel oil is pure or nearly pure residual fuel and has a high sulphur content (3.5%).

<sup>20</sup> Marine diesel fuel is a blend of heavy fuel oil and the lighter marine gas oil.



review and revision of construction and operational phase assumptions used in the EIS documentation and testing of mitigation measures. I support this commitment and require it to be undertaken by the proponent as soon as possible.

Given the assumptions used in the air dispersion model and implementation of proposed mitigation measures and proponent commitments, I am satisfied the air quality objectives for PM<sub>2.5</sub>, PM<sub>10</sub>, NO<sub>2</sub> and dust deposition at SR B, SR C, SR D and SR E would be within the air quality criteria. To ensure that sensitive receptors are not affected by air quality impacts, I have stated conditions (Appendix 2) that the project must not cause environmental nuisance.

### Construction mitigation measures

In addition to the specific mitigation measures listed above, the CEMP will include standard mitigation measures, which include:

- dust and wind will be monitored onsite and work that may generate dust will cease if strong winds occur
- all project personnel will receive training in air quality control practices
- water carts, sprinklers and sprats and dust screens will be used where appropriate to control dust emissions from exposed surfaces and dust generating activities at a frequency appropriate to conditions
- rumble grids and coarse aggregate will be installed at exit roads to prevent soil being deposited into public roads
- manual cleaning of vehicles and roads will be conducted as required
- construction equipment, including dredging vessels, will be properly maintained to ensure exhaust emissions comply with relevant standards
- drop heights from trucks will be less than two metres
- truck loads are to be covered
- any complaints from the public are to trigger investigation by the operator to determine appropriate control measures
- waste will be segregated and collected regularly to control odours.

The CEMP describes the monitoring and corrective actions that would be implemented in the event of air quality complaints. Complaints will be recorded and responded to in a timely manner. Air quality monitoring for 12 months in accordance with the EPP (Air) may be implemented as part of complaint resolution. The CEMP confirms the existing complaints procedure will be reviewed to ensure it is adequate to address any issues that may arise as a result of the project.

Submissions received on the EIS documentation confirmed the proponent should implement air quality mitigation measures identified in the EIS documentation. The proponent will include standard and specific mitigation measures in the CEMP and to implement during construction.

## Operational impacts

Following completion of project construction, the EIS documentation forecast 177 cruise ships, including 164 mega cruise ships would berth in the Port of Cairns in 2026. The EIS found with the construction of Wharf 6, two mega class cruise ships will be able to be berthed simultaneously; however, it is anticipated that only one cruise ship will be berthed at any one time.

Associated with this increased cruise ship arrival is the associated increase of services to these cruise ships. This includes buses, taxis, private vehicles for passenger movement; delivery trucks, sewage trucks and fuel tankers to service the cruise ships.

Sources of air pollutants during operations include:

- exhaust emissions from cruise ships traversing the channel and manoeuvring to the wharf
- exhaust emissions associated with transport of people to the cruise ship terminal
- fugitive emissions from the fuel storage tank
- various emissions from activities undertaken at the wharf to service the cruise ships
- odour emissions from waste removal from cruise ships.

Submissions received on the EIS documentation raised issues regarding increased air pollution associated with increased visitation to the Port of Cairns. Also, issues regarding whether the assumptions used in the air quality modelling, in particular, the assumption that one cruise ship will be berthed at any one time, is justified given current port operations. I note the proponent has addressed the project's terms of reference by modelling worst-case emissions that may occur during operation. As presented in the EIS documentation, the air dispersion model used cruise ship numbers estimated by the AEC Group. The annual number of cruise ships were randomly assigned to a day in the year, so that on some days (30) there were two cruise ships with overlapping times at berth, but mostly one or none. I am satisfied the assumptions used in the air dispersion model are appropriate.

### Cruise ship exhaust emissions

The EIS documentation found that ships emit high levels of fine particulates, which is observable as dark smoke from the combustion of marine diesel fuel. The International Maritime Organization (IMO) through enacting the *International Convention for the Prevention of Pollution from Ships (Annex VI)* seek to control air quality impacts associated with shipping. Annex VI, regulation 14 mandates from 1 January 2020, ships must use low sulphur fuel (0.5 per cent). Annex VI, regulation 14 is to be enforced by the Queensland government by passing legislation reflecting this international law. The Queensland Government is responsible for enforcing the low sulphur fuel mandate within 3 nautical miles of land, with the responsibility for meeting the air pollution limits being up to each individual ship's operators.

Although particulate filter controls and scrubbers are not mandated for ships, the requirement to use low sulphur fuel (0.5 per cent) post 1 January 2020 would lead to the installation of scrubbers on ships and reduce the emission of fine particulates.

### *Low sulphur fuel*

To comply with the low sulphur mandate, ships must use fuel with 0.5 per cent sulphur content (or 0.1 per cent in emission control areas) or fuel with 3.5 per cent sulphur content and the use of scrubbers to achieve the same SO<sub>2</sub> emissions.

Submissions received on the EIS documentation raised issues regarding the requirement for ships to use of low sulphur fuel (0.5%) from 2020 when in port.

The EIS predicts cruise ships will meet the IMO low sulphur fuel mandate by installing scrubbers based on uptake to date and difficulty obtaining low sulphur fuel. The EIS documentation reported the installation of scrubbers reduced particle emissions by 73 per cent and that 68 per cent of cruise ships currently operating have scrubbers installed. The air quality assessment for 2028 assumed that all cruise ships will be compliant with the IMO mandate by 68 per cent of cruise ships with scrubbers installed and the remaining cruise ships using low sulphur fuel.<sup>21</sup>

The proponent has committed to conduct a survey of ship fuel consumption and fuel type whilst berthed at the wharf, prior to the commencement of construction. This fuel survey will include at least cruise ships and tankers to assist in impact prediction modelling and management planning. I support this commitment, included in this report at Appendix 6, and require it to be undertaken by the proponent.

### *PM<sub>2.5</sub> and NO<sub>2</sub>*

The EIS documentation worst-case modelling concluded that mitigated operational activities at the wharf may result in exceedances of the air quality objectives for PM<sub>2.5</sub> and NO<sub>2</sub> at the worst affected SR C, Jack & Newel Apartments. SR C is located approximately 130 m west of the wharf area. All concentrations of other pollutants are expected to be below the air quality objectives.

The EIS found when 100 per cent of cruise ships use scrubbers,<sup>22</sup> the maximum concentration of PM<sub>2.5</sub> for 24 hour averaging period would be 28 µg/m<sup>3</sup>, which is slightly above the air quality criteria of 25 µg/m<sup>3</sup>. PM<sub>2.5</sub> for a year averaging period would be 10 µg/m<sup>3</sup>, which are marginally above the air quality criteria of 8 µg/m<sup>3</sup>. I note the PM<sub>2.5</sub> objective was exceeded for one day in the modelled year when there were moderate south-east winds with neutral stability class and relatively high mixing height through the 24-hour day.

The EIS found when 100 per cent of cruise ships use scrubbers, the maximum concentration of NO<sub>2</sub> for 1 hour averaging period would be 299 µg/m<sup>3</sup>, which is above the air quality criteria of 250 µg/m<sup>3</sup>. I note the NO<sub>2</sub> concentration was exceeded for ten hours in the modelled year between 6 pm to 7 am, when there was light south to south-east winds with low mixing height at approximately 50 m.

In order to mitigate these exceedances, additional mitigation measures are provided below.

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<sup>21</sup> The EIS reported the predicted impacts for the project scenario with 68 per cent of cruise ships using a scrubber is slightly lower than the project scenario with 100 per cent of cruise ships using a scrubber, especially for the longer-term average period. Hence the air quality assessment assumes 100 per cent of cruise ships use scrubbers to present a worst-case scenario.

### **Odour emissions from waste removal**

The EIS predicts the odour emission from cruise ship waste removal would be similar to those from waste removal at land-based restaurants. To mitigate the potential odour emission impacts, the proponent proposes to avoid spillage of waste and cover the waste being removed. The EIS documentation found that with the implementation of these mitigation measures, odour from the waste removal is unlikely to cause nuisance at nearby sensitive receptors.

### **Operational mitigation measures**

In order to mitigate the impacts from the operation of the Port of Cairns, the port's Maritime Operations Management Plan is to include the following mitigation measures:

- cruise ship owners are to be encouraged to implement regular maintenance and engine tuning, install catalytic converters to reduce nitrogen oxides emissions and reduce idling time at berth before departure and after arrival
- minimise standing losses, working losses and spills in fuel storage and dispensing activities.

In addition to the above, the future use of liquefied natural gas (LNG) as fuel would further reduce particulate emissions.

The proponent has also committed to liaise with cruise ship companies, the Australian Maritime Safety Authority and DES to assist in ensuring compliance with applicable regulations requiring cruise ships to either utilise scrubbers on engines or to use low sulphur fuel, or equivalent means to achieve the required air quality emission standards whilst berthed at the wharf. I support these commitments, included in this report at Appendix 6, and require them to be undertaken by the proponent.

I am satisfied that with the implementation of proponent commitments, consultation with cruise ship companies and enforcement of the IMO low sulphur fuel mandate by DES, fine particulates and SO<sub>2</sub> emissions levels will be reduced at sensitive receptors (apartments) located adjacent to the wharf.

### **5.9.5 Coordinator-General's conclusion: Air quality**

I am satisfied that potential air quality impacts resulting from the project's construction and operation can be managed for the life of the project, consistent with the air quality objectives of the EPP (Air). The assessment predicted that construction and operational activities could potentially generate impacts above the air quality limits for PM<sub>2.5</sub>, PM<sub>10</sub>, NO<sub>2</sub> and dust deposition. However, with the mitigation measures identified above, it is expected that the potential impacts could be minimised and managed to avoid significant impacts to sensitive receptors.

I note the information provided in the EIS documentation adequately addressed the matters raised in submissions regarding air quality.

To ensure that sensitive receptors do not experience air quality impacts, I have stated conditions that the project must not cause environmental nuisance (Appendix 2).

I am satisfied the CEMP adequately describes the monitoring and corrective actions required in the event of air quality complaints. Further, I am satisfied that the stated conditions and mitigation measures would ensure air quality impacts generated through the construction and operation of the project are appropriately managed.

## 5.10 Greenhouse gas emissions

### 5.10.1 Submissions received

Submission received on the EIS documentation identified increased carbon emissions as a key issue related to greenhouse gas emissions. I have considered all submissions on the EIS documentation in my evaluation of the project.

### 5.10.2 Methodology

The EIS documentation considered six gases listed in the Kyoto Protocol and National Greenhouse and Energy Reporting Regulations 2008, which included:

- carbon dioxide (CO<sub>2</sub>)
- methane (CH<sub>4</sub>)
- nitrous oxide (N<sub>2</sub>O)
- hydrofluorocarbons (HFCs)
- perfluorocarbons (PFCs) and
- sulphur hexafluoride (SF<sub>6</sub>).

The EIS documentation reported that no data is available of current greenhouse gas (GHG) emissions from the Cairns region. The GHG emissions emitted from current cruise shipping facilities at the Port of Cairns, which includes electricity usage and fuel oil use, do not trigger the *National Greenhouse and Energy Reporting Act 2007* (Cth) and its reporting requirements.<sup>23</sup>

The EIS documentation used the National Greenhouse and Energy Reporting Scheme Measurement Technical Guidelines to estimate GHG emissions during the construction of the project and operation of the Port of Cairns.

To estimate GHG emissions impacts from cruise ships in the Port of Cairns, the EIS forecast medium and high projections of annual increases in cruise ships following project completion for 2018 and 2028.

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<sup>23</sup> Reporting is required once emissions from a facility exceed a carbon dioxide equivalent (CO<sub>2</sub>-e) of 25 000 tonnes per annum.

### 5.10.3 Impacts and mitigation measures

#### Construction impacts

The EIS documentation found GHG emissions would be generated during construction through: capital dredging operations, and fuel combustion in plant equipment used in construction.

The EIS found the largest contributor of GHG emissions during construction is fuel combustion from the TSHD.

The total GHG emissions from the construction phase are estimated to be 22.95 kilotonnes of CO<sub>2</sub> equivalent (ktCO<sub>2</sub>-e). The GHG emissions estimated to be emitted from construction activities do not trigger the *National Greenhouse and Energy Reporting Act 2007* (Cth) (NGER Act) and its reporting requirements.

#### Construction mitigation measures

In order to mitigate potential GHG emissions, the proponent has provided the following mitigation measures:

- select dredging equipment with lower emissions and maintain the engines
- undertake periodic energy and fuel audits to monitor energy and fuel use and implement reduction strategies
- provide training to drivers and employees to ensure fuel efficient practices, such as turning off engines when not in use
- inspect plant equipment to ensure fuel efficiency.

The proponent has committed to develop a GHG emissions inventory for the construction stage to monitor, report and identify opportunities to reduce emissions in accordance with the Ports North Environmental Management System; and to implement reduction strategies as appropriate. I support this commitment, included in this report at Appendix 6, and require it to be undertaken by the proponent.

#### Operational impacts

The EIS documentation found GHG emissions would be generated during operation of the port through maintenance dredging operations from fuel combustion in tugs used to move vessels, and electricity use at port.

The EIS found the largest contributor of GHG emissions during operation is from fuel combustion from the dredge. The total GHG emissions from the operation of the port are estimated to be 0.97 tonnes CO<sub>2</sub>-e. The GHG emissions estimated to be emitted from operational activities do not trigger the NGER Act and its reporting requirements which is required once emissions from a facility exceed a carbon dioxide equivalent (CO<sub>2</sub>-e) of 25 000 tonnes per annum.

I note that the GHG emissions from increased vehicle movement and increased cruise ships operations are scope 3 emissions for which the individual cruise ship operators are responsible for reporting requirements under the NGER Act.



## Operational mitigation measures

In order to mitigate potential GHG emissions, the proponent has provided the following mitigation measures:

- select dredging equipment with lower emissions and maintain the engines
- provide training or awareness programs to berthed ships on energy efficient practices
- install energy efficient measures at port, such as lighting controls and sensors
- identify opportunities to generate renewable energy at the port.

I am satisfied that GHG emissions can be adequately addressed and reduced with the implementation of proponent commitments and proposed mitigation measures.

### 5.10.4 Coordinator-General's conclusion: Greenhouse gas emissions

The assessment predicted that the total GHG emissions from the construction phase is estimated to be 22.95 kilo tonnes of CO<sub>2</sub> equivalent (ktCO<sub>2</sub>-e). The GHG emissions estimated to be emitted from construction activities do not trigger the *National Greenhouse and Energy Reporting Act 2007* (Cth) (NGER Act) and its reporting requirements.

In relation to GHG emissions, I am satisfied that the GHG assessment quantified the predicted GHG emissions with respect to scope 1 and scope 2 emissions in accordance with the methodology of the NGER Act. The mitigation measures proposed in the EIS would minimise GHG emissions throughout the construction and operation phases of the project. I note that the GHG emissions from cruise ship operations are in the category of scope 3 emissions for which the individual cruise ship operators are responsible for reporting requirements.

## 6. Dredge material delivery

### 6.1 Introduction

This section evaluates key environmental impacts associated with delivery of dredge material from the dredging area to the Tingira Street DMPA and Northern Sands DMPA.

As described in Section 2 (About the project) delivery of dredge material to the Tingira Street DMPA would require loading dredge material from the BHD to a barge. A tug boat would tow the barge to a proposed dredge barge access adjacent to Smiths Creek. A barge-mounted excavator would transfer dredge material to off-road haulage vehicles and deliver the dredge material to either of the two placement sites located within the Tingira Street DMPA.

The delivery of dredge material to the Northern Sands DMPA would require a TSHD to transport dredge material between the dredging area in Trinity Inlet and pump-out

facility located offshore from Yorkeys Knob (Figure 6.1). The TSHD would moor at the pump-out facility, where dredge material would be pumped into the delivery pipeline for transport to the Northern Sands DMPA. The offshore segment of the pipeline would be submerged.

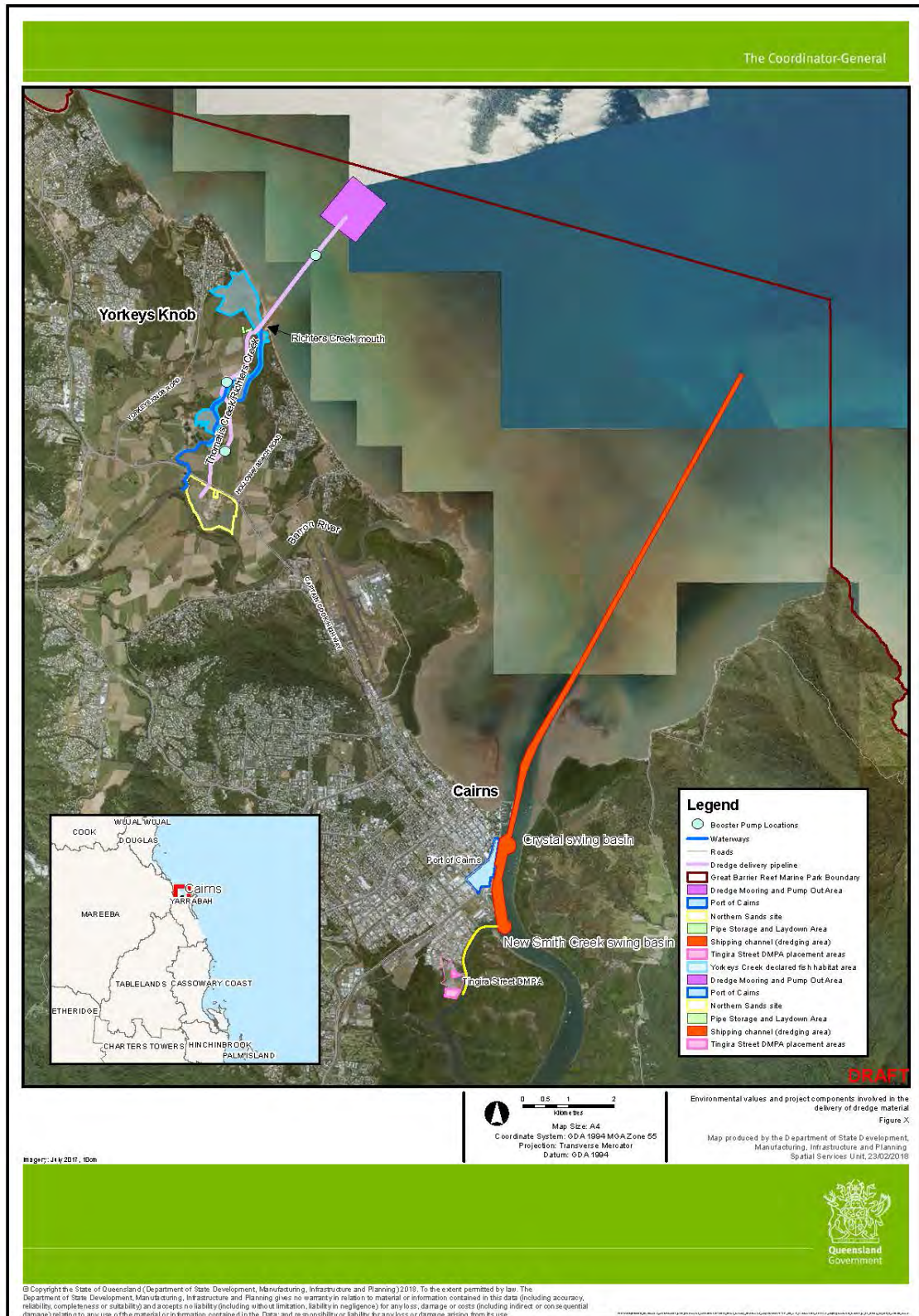
The delivery pipeline would come ashore at the mouth of Richters Creek suspended on low earthen plinths. The delivery pipeline would cross Richters Creek and cane farms before entering a culvert where it transects the Captain Cook Highway. The delivery pipeline would terminate at the Northern Sands DMPA. Three booster pumps are proposed to be placed along the delivery pipeline route to support the delivery of dredge material.

Assembly of the delivery pipeline would be undertaken at three 0.5 ha laydown areas. One laydown area would be established at the Northern Sands site and two directly adjacent to the delivery pipeline corridor. These laydown areas are inland from and on the opposite side of Richters Creek to the Holloways Beach Environmental Education Centre. The delivery pipeline is proposed to be delivered to Cairns either by road transport or sea freight in segments typically up to 12 m in length. The delivery pipeline segments would be transported by road to the laydown areas.

Following completion of the project, disassembly of the delivery pipeline, storage of plant and equipment and general works would also be undertaken at the laydown areas.

For further detail about the pre-construction, construction and decommissioning activities relating to the delivery of dredge material refer to Section 2 (About the project).

Activities associated with the delivery of dredge material to the Tingira Street DMPA and Northern Sands DMPA could affect sensitive noise receptors, marine water quality and coastal processes, matters of state environmental significance (MSES), maritime safety, state and local roads and Aboriginal and Torres Strait Islander cultural heritage. My evaluation of these impacts is discussed in the following sections.



**Figure 6.1** Environmental values and project components involved in dredge material delivery

## 6.2 Existing environment

### 6.2.1 Matters of state environmental significance

The following *Nature Conservation Act 1992* (NC Act) listed species may occur in Trinity Bay and Trinity Inlet:

- Australian snubfin dolphin (*Orcaella heinsohni*)
- Indo-Pacific humpback dolphin (*Sousa chinensis*)
- Dugong (*Dugong dugon*)
- Green turtle (*Chelonia mydas*)
- Hawksbill turtle (*Eretmochelys imbricata*)
- Flatback turtle (*Natator depressus*).

The proponent conducted surveys of the offshore segment of the delivery pipeline and the pump-out facility in August and September 2016. Surveys did not identify any seagrass and found only sparse benthic communities.

The onshore segment of the delivery pipeline is proposed to make landfall at Richters Creek mouth which is within the Yorkeys Creek declared fish habitat area (FHA). It spans 117 ha and covers Yorkeys Creek and the downstream end of Richters Creek. The EIS documentation indicate that Richters Creek mouth could provide potential habitat for the Beach stone-curlew (*Esacus magnirostris*) as surveys conducted for another project identified a breeding pair at this location.

Survey results also identified that vegetation at the mouth of Richters Creek and at delivery pipeline crossings along the creek includes mangroves, a melaleuca wetland, regulated vegetation and mapped essential habitat for the Southern cassowary (*Casuarius casuarius johnsonii*). Ant plants (*Myrmecodia beccarii*) were also located in the mangroves along Richters Creek.

### 6.2.2 Water quality and coastal processes

#### Marine water quality

The existing marine water quality within Trinity Inlet and Trinity Bay is characterised by naturally high turbidity levels, especially during periods of high rainfall and sustained winds and currents, which resuspend seabed sediments. The naturally high suspended sediment concentrations are driven primarily by south-west trade winds during the dry season, and by north and north-east winds and tropical cyclones during the wet season. The water within near-shore areas is shallow and characterised by muddy benthic sediments, which are regularly resuspended. In areas further offshore, background turbidity levels are considered low due to deeper waters and less resuspension of bottom sediments.

#### Surface water quality

Surface waterways in the vicinity of the onshore segment of the delivery pipeline include:



- the Barron River, which drains into Trinity Bay between the Cairns Airport and the township of Machans Beach
- the Thomatis/Richters Creek system, which forms a major distributary of the Barron River.

The Barron River and Thomatis/Richters Creek are typically subjected to fluctuating salinity levels due to a strong tidal influence, and receive runoff from a predominantly agricultural area.

### Coastal processes

The coastal environment traversed by the TSHD, pump-out facility and offshore segment of the delivery pipeline is considered a high energy environment comprised of highly mobile sands influenced by wind, waves and currents, and are subject to regular natural disturbance.

Longshore sediment transport in the vicinity of the offshore segment of the delivery pipeline indicates that the beach system is very dynamic, particularly in response to sand supply and movements of the mouths of the Barron River, Richters Creek and Yorkeys Creek. The long-shore sand transport regime is of relatively modest northward net movement, estimated to be less than 20 000 m<sup>3</sup> per year.

## 6.2.3 Traffic and transport

### Maritime transport

The Port of Cairns and Cairns Harbour are currently visited by cruise ships, commercial shipping vessels, navy vessels, tug boats, pilot boats and fishing and recreational vessels. The proponent manages operational vessel traffic through its operational management practices, protocols and plans and has operational jurisdiction within the Cairns Port limits. Shipping movements and navigation safety for maritime transport in the Port of Cairns and Cairns Harbour are managed by the Regional Harbour Master and the Maritime Safety Queensland (MSQ), a state government agency of the DTMR.

### Land-based transport

Key roads in proximity to the onshore segment of the delivery pipeline and Northern Sands DMPA include the Captain Cook Highway, Holloways Beach Road and Yorkeys Knob Road. Captain Cook Highway is a state-controlled road and the primary route servicing the Northern Beaches of Cairns. Holloways Beach Road and Yorkeys Knob Road are local roads that support movement of traffic from the local beach side communities to the Captain Cook Highway.

## 6.2.4 Noise

Existing noise sources surrounding the proposed Northern Sands DMPA consist predominantly of road traffic noise from the Captain Cook Highway. Insect and bird noise and intermittent jet aircraft landing at Cairns Airport are also existing noise sources. The EIS documentation identified private residences, Yorkeys Knob State School and the Holloways Beach Environmental Education Centre as the key sensitive

receptors. All sensitive receptors are generally located between 400 m to one kilometre from the proposed delivery pipeline.

The dominant noise sources surrounding the Tingira Street DMPA includes industrial noise from the Port of Cairns, birds, road traffic, recreational boating, forklifts, cranes and other plant operating on nearby industrial properties. As the area surrounding Tingira Street is predominantly industrial, by definition in the Environmental Protection (Noise) Policy 2008 (EPP (Noise)) the only sensitive receptor is the Great Barrier Reef International Marine College, located approximately 160 m from the site.

The EPP (Noise) prepared under the *Environmental Protection Act 1994* aims to ensure that all reasonable and practicable measures are taken to protect environmental values from environmental harm; specifically, noise impacts from development. The EPP (Noise) provides acoustic quality objectives to be achieved at sensitive receptors.

### **6.2.5 Aboriginal and Torres Strait Islander cultural heritage**

The EIS documentation did not confirm any places or artefacts with Aboriginal and Torres Strait Islander cultural heritage along the onshore segment of the delivery pipeline. However, the EIS documentation indicate that there is a high potential for Aboriginal and Torres Strait Islander cultural heritage places and artefacts to be uncovered including middens, campsites and scar trees in coastal areas.

Aboriginal and Torres Strait Islander cultural heritage is protected under the *Aboriginal Cultural Heritage Act 2003* (ACH Act). The project's potential impacts to places and artefacts with Aboriginal and Torres Strait Islander cultural heritage are required to be managed through a cultural heritage management plan (CHMP).

## **6.3 Matters of state environmental significance**

### **6.3.1 Submissions received**

Submissions received on the EIS documentation identified impacts to turtles, dugongs and dolphins as key issues related to impacts on MSES from activities involved in delivery of dredge material. I have considered all submissions on the EIS documentation in my evaluation of the project.

### **6.3.2 Impacts and mitigation measures**

#### **Yorkeys Creek declared fish habitat area**

The delivery pipeline is proposed to cross the Yorkeys Creek declared FHA at the mouth of Richters Creek and upstream of Richters Creek (Figure 6.1). Approximately 0.32 ha of the Yorkeys Creek declared FHA could be temporarily affected by the construction and placement of the delivery pipeline. The pipeline is proposed to be in place for six months.



The delivery pipeline could trap sand within the FHA at Richters Creek mouth creating a possible barrier to fish passage. This would only be a temporary potential impact, given that the delivery pipeline would be in place for six months. The proponent has committed to regularly inspect the delivery pipeline at Richters Creek mouth to assess the volume of beach sand build-up and then, if required, manually relocate the sand to the active beach using a small excavator.

The proponent is committed to rehabilitating the vegetation cleared for the delivery pipeline once the pipeline has been decommissioned. Further rehabilitation details are required to be included in the finalised DMP. The DMP would be subject to DES approval prior to construction commencing.

To ensure that potential impacts on Yorkeys Creek declared FHA are adequately managed, I have stated conditions for operational works in a declared FHA, operational works that is constructing or raising waterway barrier works and operational works within a coastal management district. These approvals would be obtained by the proponent prior to construction commencing.

### **Marine plants**

The EIS documentation indicates that the delivery pipeline and pump-out facility may affect marine plants including benthic communities, mangroves and a melaleuca wetland.

#### **Benthic communities**

The EIS documentation reported that construction of the onshore segment of the delivery pipeline would directly impact 0.12 ha of subtidal river bank at the mouth of Richters Creek, which may contain benthic communities. The impact would be temporary and short term (six months), as the delivery pipeline would be decommissioned once placement of dredge material at the Northern Sands DMPA is complete.

To ensure impacts to benthic communities are minimised and appropriately managed, I have stated conditions for the operational works approval for disturbance to marine plants (Appendix 2).

#### **Mangroves**

Approximately 0.16 ha of mangroves may be cleared at the proposed delivery pipeline crossings along Richters Creek. The impact area will be confirmed by the proponent during the detailed design stage of the project.

The proponent is committed to rehabilitating the vegetation cleared for the delivery pipeline once the pipeline has been decommissioned. Further rehabilitation details are expected to be included in the finalised DMP.

The EIS documentation reports that the cleared mangroves may take more than five years to rehabilitate to pre-disturbance habitat values. This is a significant residual impact to marine plants. Mangroves are also a matter of national environmental significance (MNES) and impacts would be managed by the Commonwealth

Department of the Environment and Energy (DEE). I note that DEE will consider offset conditions for significant residual impacts to MNES. The proponent has committed to refine the delivery pipeline route during detailed design to avoid clearing mangroves as far as possible.

I note the proponent's commitments to avoid potential impacts during construction of the delivery pipeline and to rehabilitate unavoidable impacts to mangroves after the delivery pipeline is decommissioned. To further ensure that impacts to mangroves are adequately managed, I have stated conditions for the operational works approval for disturbance to marine plants (Appendix 2). The offset requirements for significant residual impacts to marine plants would be finalised during the detailed design stage of the project as part of the operational works approval for disturbance to marine plants.

### **Melaleuca wetland**

A total of approximately 0.14 ha of melaleuca wetland situated at the mouth of Richters Creek is required to be cleared to construct the onshore segment of the delivery pipeline.

The proponent is committed to rehabilitating the melaleuca wetland cleared for the delivery pipeline once the pipeline has been decommissioned. Further rehabilitation details are expected to be included in the finalised DMP.

The EIS documentation reports that the cleared melaleuca wetland could take more than five years to rehabilitate to pre-disturbance habitat values. This is a significant residual impact to marine plants. Melaleuca wetland vegetation is also a MNES and impacts would be managed by the DEE. I note that DEE will consider offset conditions for significant residual impacts to MNES. The proponent has committed to refine the delivery pipeline route during detailed design to avoid clearing melaleuca wetland.

I note that the proponent has committed to confirm the impacts of the final detailed design of the delivery pipeline on the wetland and provide offsets for any significant residual impacts, if required.

I note the proponent's commitments to avoid potential impacts during construction of the delivery pipeline and to rehabilitate unavoidable impacts to the melaleuca wetland after the delivery pipeline is decommissioned. To further ensure that impacts to the melaleuca wetland are appropriately managed, I have stated conditions for the operational works approval for disturbance to marine plants (Appendix 2). The offset requirements for significant residual impacts to marine plants would be finalised during the detailed design stage of the project as part of the operational works approval for disturbance to marine plants.

## **Protected wildlife**

### **Terrestrial wildlife**

#### *Ant plant*

Ant plants would be affected by construction of the onshore segment of the delivery pipeline. Approximately 0.27 ha of coastal woodland and mangroves that provide ant

plant habitat along Richters Creek are proposed to be cleared to construct the delivery pipeline.

As discussed in the marine plants section above, clearing mangroves would be regulated under the development permit for operational works for disturbance to marine plants. Furthermore, the DMP states that vegetation cleared for the delivery pipeline would be rehabilitated.

The proponent has committed to undertake pre-clearance surveys within the delivery pipeline corridor to confirm the number of ant plants that may be affected.

To mitigate impacts to ant plants and to ensure there is no net loss of the species, the proponent has committed to translocate all directly affected ant plants to suitable nearby habitat before any vegetation is cleared.

The pre-clearance surveys will inform preparation of the translocation plan that the proponent will submit to DES for approval before construction starts. The plan will include a monitoring program to verify translocation success.

The DMP will be approved by DES prior to construction commencing. The EIS documentation estimate that rehabilitating ant plant habitat will take longer than ten years because the vegetation needs to grow sufficiently tall and have a relatively closed canopy to support ant plant habitat.

I am satisfied that translocation and rehabilitation would ensure that potential impacts to ant plants from constructing the onshore segment of the delivery pipeline are adequately managed and that the project is unlikely to result in a net loss of the species.

If clearing ant plant habitat is considered to have a significant residual impact, an offset for protected wildlife habitat will be required in accordance with the EO Act. This will be determined when the proponent applies for the protected plant clearing permit application, which is required to be obtained from DES before construction commences.

#### *Beach stone-curlew*

Potential breeding habitat for the Beach stone-curlew may occur at Richters Creek mouth, where a breeding pair of Beach stone-curlews was recorded during surveys for another project. The delivery pipeline is proposed to make landfall at this location and potentially impact 0.14 ha of potential breeding habitat for the species, which is a significant residual impact under the EO Act.

Beach stone curlews breeding at Richters Creek mouth could be temporarily impacted by constructing and decommissioning the onshore segment of the delivery pipeline. Noise generated from construction plant and equipment could also deter Beach stone-curlews from using the area.

In the instance that the breeding Beach stone-curlews are recorded at Richters Creek mouth, the proponent has also committed to implement the threat abatement actions listed in the Species Recovery Information Gateway (SPRING) database. Actions listed in the SPRING database include:

- mapping habitat for the Beach stone-curlew
- contributing to feral dog controls
- monitoring the effectiveness of management actions to reduce disturbance to Beach stone-curlews
- increasing awareness of local residents regarding urban development impacts to Beach stone-curlews.

Furthermore, the proponent has committed to avoid negative impacts on the species by conducting works for the delivery pipeline at Richters Creek mouth outside of the species' breeding season, which occurs from September to February. The proponent is required to confirm the impact area during detailed design and provide offsets in accordance with the EO Act. The proponent has also committed to rehabilitate the site once the delivery pipeline is decommissioned to ensure the return of the habitat values.

I have stated a condition for the dredging EA stating the maximum extent for impacts to Beach stone-curlew breeding habitat as a result of the project (Appendix 2). I have also made a recommendation in Appendix 4 for the proponent to develop and deliver a management plan that provides a management framework to avoid and mitigate impacts of the project on the Beach stone-curlew and its habitat. Plans to deliver any required offsets should be included in the management plan.

#### *Southern cassowary*

The EIS documentation reported that essential habitat for the Southern cassowary is located at Richters Creek mouth. Constructing the delivery pipeline through Richters Creek mouth could require clearing of this habitat. The proponent has proposed to use an existing cleared track that intersects the essential habitat to avoid clearing habitat.

During the detailed design stage, the proponent would undertake additional surveys to confirm the presence of essential habitat and the amount of vegetation required to be cleared for the delivery pipeline, if any. Clearance of the essential habitat is regulated under the *Vegetation Management Act 1999* and the *Nature Conservation Act 1992* and the proponent may require a permit prior to commencement of clearing.

The proponent is committed to rehabilitating the essential habitat for the southern cassowary once the delivery pipeline has been decommissioned. Further rehabilitation details are required to be included in the finalised DMP. I also note that the DMP would be subject to DES approval prior to construction commencing.

### **Marine wildlife**

#### *Artificial lighting impacts to marine turtles*

The EIS documentation identified that marine turtles may nest in the harbour and infrequently along the northern beaches of Cairns.

Marine turtles could become disoriented due to artificial lighting, particularly during nesting and hatching periods. Marine turtles may also be affected by light spill from the dredgers and the pump-out facility. Submissions on the EIS documentation raised

issues about potential artificial lighting impacts on marine turtles as the pump-out facility and dredgers would operate 24 hours a day for 12 weeks.

To avoid disorienting turtles that may be nesting or hatching in the harbour or at the northern beaches, the proponent has committed to minimise light spill. The measures include using low wattage and/or directional light fixtures that do not conflict with security and safety requirements. Light levels from the dredging works will be limited to those lights that are necessary for the safe operation of the vessel and the health and safety of those onboard.

These mitigation measures would be further detailed in the final DMP and I am satisfied that these mitigation measures would ensure that potential artificial lighting impacts to marine turtles are adequately managed. I also note that the DMP would be subject to DES approval prior to construction commencing.

#### *Vessel strike impacts to marine wildlife*

Inshore dolphins, dugongs and turtles may be injured by interacting with moving vessels and dredgers during construction, operation and decommissioning of the project. Submissions on the EIS documentation raised issues about impacts on marine wildlife during the dredging campaign and during operation of the port. Potential impacts to marine wildlife from port operations are addressed in Section 5 (Capital dredging and port upgrades).

Marine wildlife that swim near the water surface could interact with the tug boats and barge when they navigate from the shipping channel to the Tingira Street DMPA and when the TSHD sails to the pump-out facility. To ensure that the risk of vessel strike is minimised, the proponent has committed to prepare and implement the DMP that includes the following measures:

- ensuring that vessel masters and spotters are adequately trained in marine mammal and sea turtle interaction procedures
- maintaining a lookout for marine wildlife while the dredge operates
- maintaining a 300 m exclusion zone between the vessel and marine mammals, when they are sighted. In the event that a marine mammal is sighted, vessel speed and direction will be adjusted until the animal has moved further than 300 m or has not been sighted for 15 minutes.

The proponent would also ensure that animal sightings and any relevant actions taken will be recorded, and that any incidents involving injured or killed animals will be immediately reported to relevant regulatory agencies.

I am satisfied that these mitigation measures would ensure that the potential incidence of vessel strike is adequately managed. I also note that the DMP would be subject to DES approval prior to construction commencing.

#### **Regulated vegetation**

Approximately 0.14 ha of the 'of concern' regional ecosystem (RE) 7.2.9a and of concern RE 7.3.25a (part of the melaleuca wetland) would be cleared during construction of the delivery pipeline at the Richters Creek mouth.

The EIS documentation state that the delivery pipeline corridor is expected to be a maximum width of ten metres. To ensure impacts on regulated vegetation is minimised, the proponent is committed to refining the delivery pipeline alignment to avoid vegetation clearing as far as possible.

In the instance that clearing RE 7.2.9a and RE 7.3.25a cannot be avoided, the proponent may be required to obtain a regulated vegetation clearing permit under the *Vegetation Management Act 1999* and *Planning Act 2016*. If clearing is greater than ten metres wide, an offset may be required in accordance with the EO Act. This will be determined during detailed design and will be determined as part of the operational works approval for tidal works that would be issued by DSDMIP. DNRME would be a referral agency for project impacts to regulated vegetation.

I note the project may be exempt from requiring a permit for clearing regulated vegetation under Schedule 21, part 1, item 14(b) of the Planning Regulation 2017. I expect DNRME to confirm if the exemption applies to the project as part of the downstream approvals process.

### **6.3.3 Coordinator-General's conclusion: Matters of state environmental significance**

I am satisfied that the proponent has assessed potential impacts on MSES that could occur as a result of delivering dredge material. Constructing the delivery pipeline would require clearing up to 0.59 ha of the Yorkeys Creek declared FHA, marine plants and protected wildlife habitat for ant plants and the Beach stone-curlew.

I note the proponent has committed to refine the delivery pipeline alignment to avoid impacts to MSES, as far as possible. I expect the proponent to undertake further ecological surveys to confirm the presence and extent of vegetation disturbance from constructing the delivery pipeline. I note that the proponent has also committed to rehabilitate any vegetation that would be required to be cleared for the delivery pipeline.

Furthermore, to minimise impacts to protected wildlife, the proponent has committed to complete works for the delivery pipeline outside of the Beach stone-curlew's breeding season (September to February) and to translocate any potentially affected ant plants to suitable nearby habitat.

I am satisfied that implementing the DMP and proponent commitments will adequately manage the project's potential impacts to MSES from delivering dredge material to the Northern Sands DMPA and Tingira Street DMPA. I note that the proponent will submit the finalised DMP for DES approval prior to construction commencing.

The project is likely to result in significant residual impacts to marine plants, particularly mangroves and melaleuca wetland, and protected wildlife habitat (mangroves) for ant plants. Any offset requirements for significant residual impacts to prescribed environmental matters under the EO Act will be determined through the following subsequent approvals:



- development permit for operational works for tidal works to be issued by DSDMIP. DAF would provide technical advice for impacts relating to declared FHAs, marine plants and waterway barrier works
- environmental authorities for capital dredging and for the Northern Sands DMPA and protected plant clearing permit issued by DES.

I have stated conditions to manage and mitigate impacts to declared FHAs, marine plants and waterway barrier works to be attached to the development permit for operational works for tidal works (Appendix 2). I have also made recommendations for the proponent to prepare a species management program for the Beach stone-curlew that must be submitted to DES for approval prior to construction commencing.

I am satisfied that the proponent commitments, mitigation measures and stated conditions would ensure any impacts to MSES as a result of the construction of the delivery pipeline are managed appropriately. Any offset requirements for significant residual impacts to matters which are also MNES will be considered by the DEE.

## 6.4 Water quality and coastal processes

### 6.4.1 Submissions received

Submissions received on the EIS documentation identified the following key issues related to water quality and coastal process and activities involved in delivering dredge material:

- leakage of dredge material from the delivery pipeline potentially impacting on marine or terrestrial surface water quality
- scouring along the delivery pipeline alignment potentially impacting water quality.

I have considered all submissions on the EIS documentation in my evaluation of the project.

### 6.4.2 Methodology

#### Water quality

Historical data for both surface and marine water quality was collated and presented in the EIS documentation including previous project assessments in 2013-2014 and data from maintenance dredging water quality monitoring until 2013. Additional water quality data was collected in July 2016 (dry season) and March 2017 (wet season) and also presented in the EIS documentation to support existing baseline surface and marine water quality data relevant to project elements and activities.

Key water quality parameters tested included physico-chemical, total suspended solids (TSS) and turbidity, Photosynthetically Active Radiation (PAR), metals, nutrients, oil and grease. A risk-based approach was adopted to classify potential impacts, as described in detail in Section 5.3 (Capital dredging and port upgrades).

Baseline water quality data was also collected for the Barron River and the upper reaches of Thomatis/Richters Creek near the confluence with the Barron River and

presented in the EIS documentation. The data identified that median baseline turbidity values for both waterways already exceed the current Water Quality Objectives (WQOs) set under the Environmental Protection Policy (Water) 2009 for turbidity in the Barron River Basin. Other indicators (dissolved oxygen, pH) were broadly consistent with WQOs. Urban stormwater flows are a key source of turbidity and pollution within the Barron River catchment.

### **Coastal processes**

Coastal systems were considered in two categories – Trinity Bay and Inlet marine hydrodynamic and sedimentation processes, and Cairns littoral and beach system processes. Historic data sources informed a baseline understanding of coastal processes. These data sources included hydrographic surveys and navigation charts of the port and shipping channel, and Commonwealth Bureau of Meteorology wind and meteorological data between 2013-2015.

Hydrodynamic and regional tide modelling was undertaken and calibrated with tide level, pressure, conductivity and temperature data. Model outputs and analysis of predicted impacts were presented in the EIS documentation.

### **6.4.3 Impacts and mitigation measures**

It is anticipated that the delivery pipeline would be in place temporarily for up to six months. No potential impacts to water quality or coastal processes are predicted beyond this period.

### **Water quality impacts**

Potential impacts to surface and/or marine water quality associated with the dredge material delivery, delivery pipeline and pump-out facility would include spill of dredge material or pipeline failure.

The EIS documentation assessed this potential impact as short-term and negligible, as standard dredge operational measures identified in the DMP would be implemented to minimise the likelihood of spills and delivery pipeline failure. The DMP also includes emergency planning and procedures in the unlikely event that a spill or delivery pipeline failure was to occur. The DMP will be approved by DES prior to construction of the project.

Risks of delivery pipeline damage or rupture due to extreme weather events are considered unlikely as dredging and transporting dredge material would be scheduled only during the dry season when extreme weather events are less likely to occur. It is unlikely that dredging would continue during an extreme weather event for safety reasons.

The EIS documentation reported that while there is the potential for propeller wash to disturb sediments in shallower areas when the TSHD moves between the shipping channel and pump-out facility, numerical modelling results indicated that sediment plumes from propeller wash would be negligible.

The potential for impacts on marine water quality from transporting stiff clays to the Tingira Street DMPA are considered short-term and negligible with implementation of the onsite stormwater management and erosion and sediment control plan. Any minor or infrequent propeller wash from the tug boats and barge moving to and from Tingira Street DMPA would be consistent with current operations in this area. Potential impacts of this wash are considered to be negligible.

Any potential onshore water quality impacts associated with earthworks during the construction of the pipeline would be mitigated by implementing best practice erosion and sediment controls. As most of the delivery pipeline route is proposed along land used for existing cane farms, earthworks for access tracks are expected to be relatively minor. The EIS documentation concluded that the potential for increased turbidity in Richters Creek from delivery pipeline construction works would be short-term and negligible.

### **Coastal processes impacts**

The EIS documentation reported that no permanent or long-term adverse impacts on coastal processes are likely to occur as a result of the delivery pipeline placement.

Without mitigation, the delivery pipeline could be a temporary barrier to local longshore sediment transport processes and may temporarily trap sand in offshore areas. To manage this impact, the proponent has committed to regularly inspect the delivery pipeline at the mouth of Richters Creek and to assess the volume of accumulated sand. In the instance that excessive amounts of sand have accumulated, a small excavator would be used to manually relocate the material to the beach. The proponent would also monitor the influence of any beach face instability to ensure that the integrity of the delivery pipeline is not compromised while the pipeline is in place.

The section of the submerged delivery pipeline in offshore areas is unlikely to trap fine-grain offshore sediment. Notwithstanding, the proponent has committed to monitor for any bathymetric changes and identify any sediment accumulation at the pipeline in offshore areas.

#### **6.4.4 Coordinator-General's conclusion: Water quality and coastal processes**

I am satisfied that the proponent has assessed potential impacts on water quality and coastal processes that could occur as a result of delivering dredge material.

The assessment predicted that potential impacts on water quality would be short-term occurring only while the delivery pipeline is in place (six months). The assessment also predicted that the potential impacts on water quality would not be adverse, as standard dredge operational measures identified in the DMP would be implemented to minimise the likelihood of potential spills and delivery pipeline failure. Similarly, the assessment predicted that there would be no permanent or long-term adverse impacts on coastal processes as a result of the delivery pipeline placement.

I consider the potential impacts on water quality and coastal processes are unlikely to be adverse as they would be short-term and can be effectively managed.

I am satisfied that implementing the DMP and proponent commitments will address the risk of potential impacts resulting from delivering dredge material to the Northern Sands DMPA and Tingira Street DMPA. I note that the proponent will submit the finalised DMP for DES approval prior to construction commencing.

To ensure impacts on water quality and coastal processes are appropriately managed and mitigated, I have stated conditions (Appendix 2) for the following development approvals that the proponent is required to obtain prior to commencement of construction:

- EA for ERA 16 for capital dredging
- Operational works for constructing or raising waterway barrier works in fish habitat area.

I am satisfied that the proponent commitments, mitigation measures and stated conditions would ensure any impacts to water quality and coastal processes as a result of the construction of the delivery pipeline are managed appropriately.

## **6.5 Traffic and transport**

Impacts to traffic and transport from delivering dredge material was not a key issue raised in submissions received on the EIS documentation. I acknowledge the potential for traffic and transport impacts and have considered them in the assessment below.

### **6.5.1 Methodology**

#### **Land-based transport**

The proponent conducted the land-based traffic assessment using DTMR's multi-combination route mapping for Cairns City in accordance with the Guidelines for Assessment of Road Impacts of Development 2006 (GARID). This methodology was current at the time of assessment and in accordance with the TOR for the EIS.

The assessment considered potential impacts on the existing road network from traffic generated during the pre-construction, construction and decommissioning phases across the three laydown area sites.

Traffic associated with the haulage of delivery pipeline segments to and from the pipeline construction laydown areas were of particular significance in the assessment. To further detail the impacts of these movements, the EIS documentation undertook a Sidra analysis to investigate the impact of the manoeuvrability and turning through intersections of B-double vehicles.

### **6.5.2 Impacts and mitigation measures**

#### **Maritime transport**

The EIS documentation reports that dredgers, tug boats and associated vessels have the potential to impact on vessel safety by accidentally obstructing the navigation of other vessels accessing the port. Potential vessel interactions could occur when:

- installing, operating and decommissioning the pump-out facility and offshore section of the delivery pipeline
- transporting dredge material to the pump-out facility and to the Tingira Street DMPA
- transporting construction personnel and vessel supplies relating to the offshore section of the delivery pipeline
- manoeuvring dredging plant and barges
- surveying the navigation areas associated with the pump-out facility.

To manage vessel safety and avoid obstruction of navigation by other vessels, the proponent would:

- prepare and implement a vessel transport management plan (VTMP) to manage potential marine traffic and safety issues from vessel operations and maritime works during all construction phases of the project. The VTMP would include the implementation of mitigation measures designed to manage health and safety aspects from transporting dredge material to both DMPAs and would be approved by the Regional Harbour Master (RHM).
- maintain communication with vessel owners and Maritime Safety Queensland (MSQ) to ensure optimum use of the shipping channel and inner port use during all construction stages and decommissioning.

I have been advised by MSQ that the draft VTMP contained in the EIS documentation is satisfactory and that the proponent's assessment has been conducted in accordance with relevant MSQ guidelines. I am satisfied that the mitigation measures proposed by the proponent would ensure that all vessel traffic can be effectively managed through the VTMP.

The proponent has committed to mitigate potential impacts to fishing and recreational vessel traffic using Richters Creek and the marine areas adjacent to Yorkeys Knob during pre-construction, construction and decommissioning of the delivery pipeline. The proponent has committed to erect appropriate signage on the bank of Richters Creek outlining depth information to mitigate any potential danger to boat users and conduct ongoing and timely communication with relevant stakeholders.

In accordance with the *Transport Operations (Marine Safety) Act 1994*, the Harbour Master will issue a Standard for Marine Construction Activities within Cairns Harbour which will detail requirements for vessels, operation and traffic control during construction of the project.

### Land-based transport

The road haulage of the delivery pipeline segments and associated plant equipment is anticipated to occur outside of peak traffic periods (7am to 9am and 4pm to 6pm) for two weeks during pre-construction and decommissioning. Haulage routes have a potential to cause temporary short-term impacts on the local and state-controlled road networks.

Dredge delivery pipeline infrastructure and plant equipment is proposed to be delivered to the three laydown sites by 2.55 m wide B-double trucks. The EIS documentation indicate that two of the laydown areas are likely to require access from local roads.

These included Holloways Beach Road to access the Yamaji property laydown area and Yorkeys Knob Road to access the Pappalardo property laydown area. Access to the Northern Sand Quarry laydown area would most likely occur from the state-controlled Captain Cook Highway.

The EIS documentation concluded that the impact of project-related traffic generation associated with these project activities would not exceed the 5 per cent baseline under the GARID and would not trigger further assessment. The EIS documentation found the road network would be able to accommodate B-double truck movements including manoeuvring and turning and that transporting the delivery pipeline segments would not significantly impact the capacity of the road network. To ensure the project does not result in unacceptable impacts on the local and state-controlled network, the following measures would be implemented:

- construction of temporary vehicle access on Holloways Beach Road and Yorkeys Knob Road with the provision of traffic controllers to facilitate safe access and egress of heavy vehicles
- upgrade of the temporary access areas to address the project's potential impacts and reduce risks associated with hauling delivery pipeline segments to the laydown areas.

I am satisfied that to manage any excess-mass or over-dimensional loads for heavy vehicles, the proponent will prepare a management plan for all phases of the project and will consult with DTMR, CRC and the Queensland Police Service prior to commencement of the project.

I am satisfied that appropriate traffic controls would be applied and relevant permits from CRC and DTMR would be sought by the proponent for transporting the delivery pipeline and plant equipment. To ensure all project-related traffic impacts are adequately managed, I have recommended conditions requiring the proponent to prepare and implement a traffic management plan and a heavy vehicle haulage management plan in accordance with DTMR and CRC requirements.

### **6.5.3 Coordinator-General's conclusion: Traffic and transport**

#### **Maritime transport**

I am satisfied that the proponent has assessed potential impacts in accordance with relevant MSQ guidelines on maritime transport that could occur as a result of delivering dredge material.

Activities involved in the delivery of dredge material could impact on the safety of maritime vessels using Trinity Inlet, Trinity Bay and Richters Creek. Potential impacts to maritime safety would only be short-term, occurring only during pre-construction, operation and decommissioning of the pump-out facility and delivery pipeline. I note that the proponent has committed to address any possible disruption to maritime vessel users near the mouth of Richters Creek by erecting appropriate signage on the bank of Richters Creek outlining depth information.



I note that the proponent is required to update current practices and protocols for maritime safety and vessel traffic management to provide for the predicted increase in maritime traffic. I am satisfied that the measures included in the VTMP would adequately manage the risk to maritime safety over the life of the project.

I have stated a condition for the operational works permit for tidal works within a coastal management district requiring the proponent to address maritime safety and traffic impacts relating to delivery of dredge material in the VTMP in consultation with the RHM prior to commencement of the project.

I am satisfied that the proponent commitments, mitigation measures and stated conditions would ensure any impacts to maritime traffic as a result of activities involved in the delivery of dredge material are managed appropriately.

### **Land-based transport**

I am satisfied that the proponent's road impact assessment is appropriate for this project. Hauling delivery pipeline segments to the laydown areas along the delivery pipeline corridor could have short-term impacts on local and state-controlled road networks. I note the proponent commitment to manage the access and egress at the Holloways Beach and Yorkeys Knob Roads laydown areas. I am satisfied that the provision of traffic controllers at the laydown area will provide safe access for heavy vehicles during the pre-construction and decommissioning phases.

To ensure that potential impacts on local and state-controlled road networks are appropriately managed, I have recommended a condition for the proponent to prepare a heavy vehicle haulage management plan in consultation with DTMR, CRC and Queensland Police Service. I have also recommended a condition for the proponent to submit a TMP to DTMR and CRC for any works interfering with local and state-controlled roads.

I am satisfied that the proponent commitments, mitigation measures and recommended conditions would ensure any impacts to local and state-controlled road networks as a result of hauling delivery pipeline segments to the laydown areas are managed appropriately.

## **6.6 Noise**

Noise impacts from the delivery of dredge material was not a key issue raised in submissions received on the EIS documentation. I acknowledge the potential for noise impacts and have considered them in the assessment below.

### **6.6.1 Methodology**

The proponent conducted background noise monitoring at sensitive receptors located near the pipe laydown area and proposed booster pump locations. Data was gathered in accordance with the DES Noise Measurement Manual (2013).

In the absence of Queensland construction noise criteria, the NSW Department of Environment and Climate Change 'Interim Construction Noise Guideline' (2009) (ICNG)

was used to develop noise level targets for the project. The ICNG recommends management levels for noise at residences and how they are to be applied, including the highly noise affected level (75 dB(A)) above which there may be strong community reaction to noise. Table 6.1 presents construction noise level targets for each project area that the proponent would be required to comply with during construction. These targets were developed based on the existing background noise levels and are represented by the rating background level (RBL). The Leq (15 min) represents equivalent continuous sound averaged across a 15-minute period.

Refer to Table 4.1 in Appendix AU of the EIS documentation for the specific locations associated with each monitoring location.

**Table 6.1 Background noise levels and derived construction noise level targets (Source: RDEIS Appendix AU)**

Monitoring location	Measured background noise (RBL (L <sub>90</sub> )) <sup>24</sup>			Construction noise level targets (dB(A) Leq(15min))		
	Day	Evening	Night	Day	Evening	Night
<b>B1</b>	48	43	45	58	48	37 <sup>25</sup>
<b>C1</b>	41	41	38	51	46	37
<b>L2</b>	32	33	30	42	37 <sup>26</sup>	35

The assessment considered a best-case and worst-case scenario, where the best case assumes wind speeds of zero metres per second with 60 per cent humidity, while the worst case assumes wind speeds of two metres per second with 80 per cent humidity. The worst-case scenario is representative of a conservative assessment with potential impacts likely to be lower than predicted.

Noise associated with the movement of the tug boat and hopper barge to the Tingira Street DMPA was not included in the noise assessment. Noise generated by these activities is expected to be minimal and therefore is not expected to result in environmental nuisance. The EIS documentation state that vibration impacts associated with the delivery of dredge material were also considered minor and not included in the assessment.

## 6.6.2 Impacts and mitigation measures

### Delivery pipeline

Noise associated with the construction of the delivery pipeline would include noise generated from the pipe fabrication – drilling, cutting and lifting – and noise from dozers

<sup>24</sup> The noise level exceeded for 90% of the measurement period.

<sup>25</sup> Night time values have been capped at or below 37 dB(A) in accordance with limits outlined in the EPP(Noise).

<sup>26</sup> Based on measured daytime L<sub>90</sub> of 32 dB(A), which is 1dB lower than the evening level

and excavators working along the pipeline route. Excavation work would be required to cut the sandbar at the Richters Creek mouth at Yorkeys Knob, and is expected to take up to a week to complete. Two 40 tonne excavators would be required.

From construction to decommissioning, the pipeline would be in place for approximately 6 months. The EIS documentation state that construction is to be limited to standard construction hours (6.30 am to 6.30 pm Monday to Saturday), in accordance with the EP Act.

The assessment predicted that only noise generated from the fabrication of the delivery pipeline on the Richters Creek land based laydown site would comply with the construction noise level target of 42  $L_{eq}(15min)^{27}$  adjusted decibels (dB(A)) during both best-case and worst-case conditions. For all other activities, and in the absence of mitigation measures, the EIS documentation predict noise levels higher than the noise targets at the nearest sensitive receptors (refer to Table 6.2).

**Table 6.2 Predicted increases in noise levels above targets from delivery pipeline construction, commissioning and decommissioning (Source: RDEIS Appendix AU)**

Sensitive receptor/ activity	Construction noise level target (dB(A))	Potential noise increase (best- case) (dB(A))	Potential noise increase (worst- case) (dB(A))
<b>Sandbar cutting</b>			
Holloways Beach Environmental Centre	42	-	4
30 Acacia Street, Holloways Beach	42	-	2
<b>Dozer and excavator working along delivery pipeline route</b>			
Holloways Beach Environmental Centre	42	-	5
30 Acacia Street, Holloways Beach	42	3	7
Morabito Road, Yorkeys Knob	42	10	13
72 Barronia Crescent, Holloways Beach	42	2	7
108 Barronia Crescent, Holloways Beach	42	-	1
613 Holloways Beach Access Road	51	-	1
<b>Noise from pipe fabrication and dozer and excavator crew combined</b>			
Holloways Beach Environmental Centre	42	-	5

<sup>27</sup> Equivalent continuous sound averaged across a 15-minute period

Sensitive receptor/ activity	Construction noise level target (dB(A))	Potential noise increase (best- case) (dB(A))	Potential noise increase (worst- case) (dB(A))
30 Acacia Street, Holloways Beach	42	3	7
Morabito Road, Yorkeys Knob	42	10	13
72 Barronia Crescent, Holloways Beach	42	2	7
108 Barronia Crescent, Holloways Beach	42	-	1
613 Holloways Beach Access Road	51	-	1

Sensitive receptors located at 30 Acacia Street, Holloways Beach, Morabito Road, Yorkeys Knob and 72 Barronia Crescent, Holloways Beach are likely to experience noise levels higher than the noise target during both best- and worst-case conditions. The highest predicted noise level above the noise targets (up to 13 dB(A)) is predicted at Morabito Road, Yorkeys Knob, where the delivery pipeline is proposed to run directly through the property.

The EIS documentation anticipate that sensitive receptors would not be subjected to the predicted noise levels for more than a few days, assuming a delivery pipeline construction rate of 200 m per day. The EIS documentation also note that the predicted noise level at Morabito Road, Yorkeys Knob is well below the 'highly affected' noise level of 75 dB(A)  $L_{eq}(15 \text{ min})$ , as prescribed by the NSW Department of Environment and Climate Change's ICNG.

Similarly, as sandbar cutting is expected to take approximately one week, the EIS documentation anticipate that sensitive receptors would only be affected by minor increases in noise levels (up to 4 dB(A)) from sandbar cutting for a short period of time.

To address the identified increases in noise levels associated with the construction of the delivery pipeline, the proponent would implement the following mitigation measures:

- construct temporary noise barriers or earth bunding around the pipe fabrication area
- communicate with stakeholders regarding date and times when sandbar cutting and delivery pipeline construction and decommissioning work would be undertaken, and when such activities could be audible
- select lower noise plant (excavators and dozers)
- revise the noise assessment and investigate additional mitigation measures if the methods of construction and decommissioning or the location of the proposed delivery pipeline alignment is altered significantly.

Following finalisation of locations, the proponent has committed to undertaking site specific noise assessments of the pump-out facility, delivery pipeline construction noise and booster pumps. The proponent has also committed to preparing a construction

noise and vibration management plan for specific project areas which would include the mitigation measures outlined in the EIS documentation.

I have stated conditions in Appendix 2 for the Northern Sands DMPA setting noise limits and requirements for noise monitoring to ensure that noise associated with the construction of the delivery pipeline is managed to avoid nuisance to sensitive receptors.

### Pump-out facility

TSHD pump-out will occur concurrently with the TSHD dredging program, 24 hours per day, seven days per week for 12 weeks. The pump-out facility is proposed to be located between 2.7 and 3.7 km offshore from Yorkeys Knob.

The assessment considered noise levels from the pump-out facility in combination with noise from the booster pumps, as these would operate simultaneously. At the nearest sensitive receptors, noise levels produced from the pump-out facility and booster pumps would comply with the relevant noise level targets during best-case conditions. However, increases in noise levels are predicted during worst-case conditions, as outlined in Table 6.3.

**Table 6.3 Predicted noise level increases above noise targets for pump-out facility (Source: RDEIS Appendix AU)**

Sensitive receptor	Construction noise level target (night) Leq(15min) dB(A)	Predicted noise levels above noise targets (worst-case) (dB(A))
Holloways Beach Environmental Education Centre	35	4
2-4 Deauville Close, Yorkeys Knob/Yorkeys Knob State School/Yorkeys Knob Road	35	2
30 Acacia Street, Holloways Beach	35	3
72 Barronia Crescent, Holloways Beach	35	1
108 Barronia Crescent, Holloways Beach	35	2

The assessment notes that the noise produced by the pump-out facility in isolation would meet the night time noise level targets. However, when combined with the predicted noise emissions from the booster pumps, increases in noise levels above targets may occur. The Holloways Beach Environmental Education Centre would experience the highest level increase of 4 dB(A) above the noise target.

Locating the TSHD as far offshore as practically possible to minimise noise levels to on-shore receptors during pump-out was identified as a possible mitigation measure. Further, the proponent has committed to conducting a site-specific noise assessment of emissions likely to be produced by the pump-out facility, once the TSHD has been selected and pump locations are known.

I have stated conditions in Appendix 2 for the EA for Northern Sands DMPA setting noise limits and requirements for noise monitoring to ensure that noise associated with the operation of the pump-out facility is managed to avoid nuisance at sensitive receptors.

### Booster pumps

Three booster pumps would be required to pump dredge material to the Northern Sands DMPA via the delivery pipeline, with one pump proposed to be located offshore and two proposed on land. The EIS documentation states that booster pumps would be in operation 24 hours per day, seven days per week while the delivery pipeline is required for the project, which is anticipated to be 12 weeks.

The assessment of potential noise impacts from booster pumps assumed that the booster pumps were attenuated, where the attenuation would achieve a noise reduction of 15 dB(A). The proposed attenuation included:

- enclosing the engine with an acoustically robust enclosure with internal acoustic absorption
- fitting of industrial mufflers
- selecting the quietest available plant or over-specified plant (to allow lower operating speeds for the same throughput)
- enclosing the pump.

The assessment predicted that the noise generated by the operation of the booster pumps would be compliant at all sensitive receptors under best-case conditions. During worst-case conditions, noise levels above the relevant night time noise target of 35  $L_{eq}(15 \text{ min})$  are expected at the following sensitive receptors:

- Holloways Beach Environmental Education Centre, by 3 dB(A)
- 30 Acacia Street, Holloways Beach, by 3 dB(A)
- 108 Barronia Crescent, Holloways Beach, by 1 dB(A).

The EIS documentation indicates that given the minor increases in noise levels above the targets, additional mitigation measures are likely to ensure that the relevant noise level targets are met. I note that the predicted noise levels are well below the highly affected noise level of 75 dB(A) prescribed in the ICNG. Bunding, temporary acoustic barriers or the selection of quieter plant is expected to reduce noise levels to achieve noise targets.

Altering the location of booster pumps to as far as practical from sensitive receptors was also identified as a potential mitigation measure. Further, the proponent has committed to conducting a site-specific noise assessment of the booster pumps once the location and number of booster pumps is known to finalise mitigation measures.

I have stated conditions in Appendix 2 for the Northern Sands DMPA EA setting noise limits and requirements for noise monitoring to ensure that noise associated with the operation of the booster pumps is managed to avoid nuisance at sensitive receptors.



### **6.6.3 Coordinator-General's conclusion: Noise**

I am satisfied with the assessment of potential noise impacts associated with the construction of the delivery pipeline and the operation of the booster pumps and pump-out facility.

I note that during worst-case conditions, noise levels associated with construction of the delivery pipeline are predicted to increase by up to 13 dB(A) over the noise targets at Morabito Road, Yorkeys Knob. While the booster pumps are in operation, my assessment found that during worst-case conditions three sensitive receptors are predicted to experience an increase in noise levels above targets prescribed under the ICNG. I also note that the predicted increases in noise during the operation of the pump-out facility are minor (4 dB(A) at Holloways Beach Environmental Education Centre).

I note that worst-case scenario is representative of a conservative assessment with potential impacts likely to be lower than predicted. I am satisfied that the short-term construction timeframe would ensure that any noise would not result in ongoing impacts to sensitive receptors. Furthermore, when mitigation measures are fully implemented, I am satisfied that the noise levels can be managed adequately.

Following finalisation of locations, the proponent has committed to undertake site specific noise assessments of the pump-out facility, delivery pipeline construction noise and booster pumps, and I expect that they fulfil this commitment. I note the proponent has committed to preparing a construction noise and vibration management plan for specific project areas that would include the mitigation measures outlined in the EIS documentation. I expect that the proponent implements the mitigation measures outlined within the EIS documentation for each construction activity.

I have stated conditions in Appendix 2 for the Northern Sands DMPA setting noise limits and requirements for noise monitoring to ensure that noise associated with constructing and operating the delivery pipeline, pump-out facility and booster pumps is managed to avoid environmental nuisance at sensitive receptors.

I am satisfied that the proponent commitments, mitigation measures and stated conditions would ensure any impacts to sensitive receptors to noise from constructing and operating the pump-out facility, delivery pipeline and booster pumps are managed appropriately.

## **6.7 Aboriginal and Torres Strait Islander cultural heritage**

Impacts to Aboriginal and Torres Strait Islander cultural heritage from the delivery of dredge material was not a key issue raised in submissions received on the EIS documentation. I acknowledge the potential for Aboriginal and Torres Strait Islander cultural heritage impacts and have considered them in the assessment below.

### **6.7.1 Impacts and mitigation measures**

Constructing the delivery pipeline across Richters Creek may uncover Aboriginal artefacts or cultural heritage places. Yirrganydji (Irukandji) people #2 have a registered native title claim (QC2015/004) over parts of Cairns, including Trinity Inlet. The claim area includes part of the onshore segment of the delivery pipeline and part of the inner shipping channel.

The construction environmental management plan (CEMP) states that precautionary measures such as surveying the proposed delivery pipeline corridor, particularly at Richters Creek, will be undertaken to identify and manage potential impacts to Aboriginal and Torres Strait Islander cultural heritage places and artefacts. In the event that any Aboriginal and Torres Strait Islander cultural heritage is encountered, all construction and operation activities would cease pending an inspection by a suitably qualified archaeologist and a representative from the relevant Aboriginal party.

The proponent is required to develop a CHMP in accordance with the ACH Act. The proponent has committed to developing a CHMP with the Yirrganydji (Irukandji) people #2 and any other relevant Aboriginal party for whom cultural heritage sites or artefacts may be uncovered by the project, prior to construction commencing.

### **6.7.2 Coordinator-General's conclusion: Aboriginal and Torres Strait Islander cultural heritage**

I am satisfied that the proponent has investigated and assessed potential impacts on Aboriginal and Torres Strait Islander cultural heritage that could occur as a result of delivering dredge material. I note that assessment indicated that constructing the delivery pipeline across the Richters Creek may uncover Aboriginal artefacts or cultural heritage places.

I note that the proponent is engaging with the relevant Aboriginal and Torres Strait Islander parties and has committed to develop CHMPs with each affected party. I am satisfied with the proposed mitigation measures identified in the CEMP and consider they can adequately manage potential impacts.

All CHMPs must be registered with DATSIP before DES can issue the environmental authority for placing dredge material at the Northern Sands DMPA. I am satisfied that the proponent commitments and mitigation measures would ensure any impacts to Aboriginal and Torres Strait Islander cultural heritage as a result of the construction of the delivery pipeline are managed appropriately.

## **7. Onshore placement of dredge material**

### **7.1 Introduction**

This section evaluates key environmental impacts associated with the placement of dredge material at the Northern Sands DMPA and Tingira Street DMPA.

### **7.1.1 Northern Sands DMPA**

As discussed in Section 2 (About the project), the dredge material would be placed during the dry season within the Northern Sands DMPA with the assistance of diffuser and spreader devices over a 12-week period. It is predicted that the earth bund would remain in place over one wet season to allow for sufficient time for settlement of the dredge material. Weir boxes connected to the tailwater pipeline would be used to control the water depth within the Northern Sands DMPA and to manage the quality of water being discharged into the Barron River.

A temporary tailwater pipeline would be constructed from the Northern Sands DMPA to the Barron River. The tailwater pipeline would run along the south-west side of Captain Cook Highway road reserve and discharge tailwater at an outfall under the Captain Cook Highway bridge.

Following completion of the placement activities, the tailwater pipeline would be decommissioned and removed. Once sufficient settlement of dredge material is reached, the earth bund would also be decommissioned and removed.

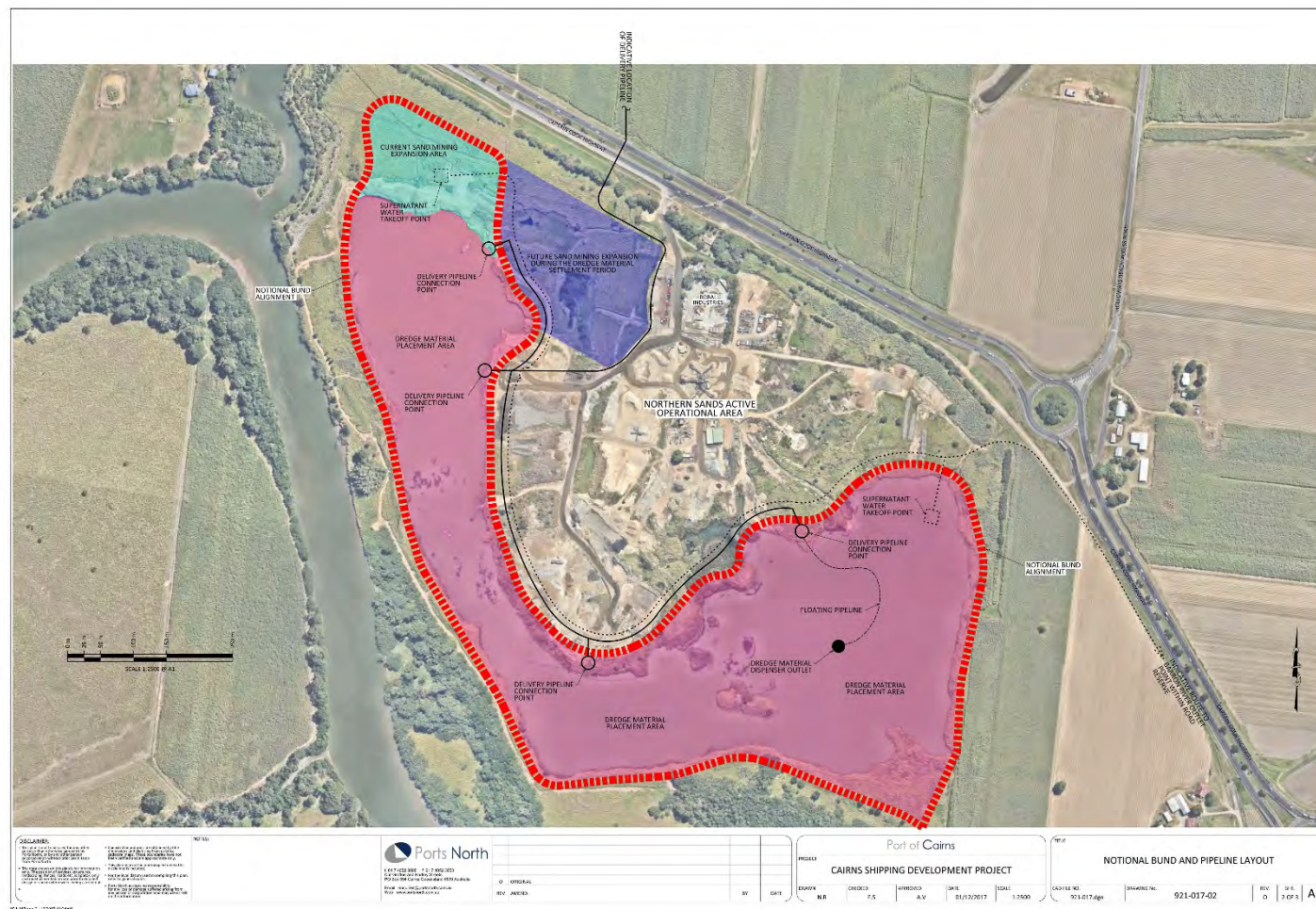
### **7.1.2 Tingira Street DMPA**

The Tingira Street DMPA includes two placement areas, located at the southern and northern extent of the DMPA and totalling up to 5.6 ha in area. Each placement area would be serviced by a barge ramp facility. A crane or excavator would transfer the stiff clay dredge material from the barge ramp and place it onto heavy vehicles for haulage onto the placement areas.

As shown in Figure 7.2, the southern placement area abuts Smiths Creek to the east and a mangrove system to the west. The northern placement area also abuts Smiths Creek to the east and commercial premises to the north and south. Towards the west, the northern placement area has frontage to Tingira Street.

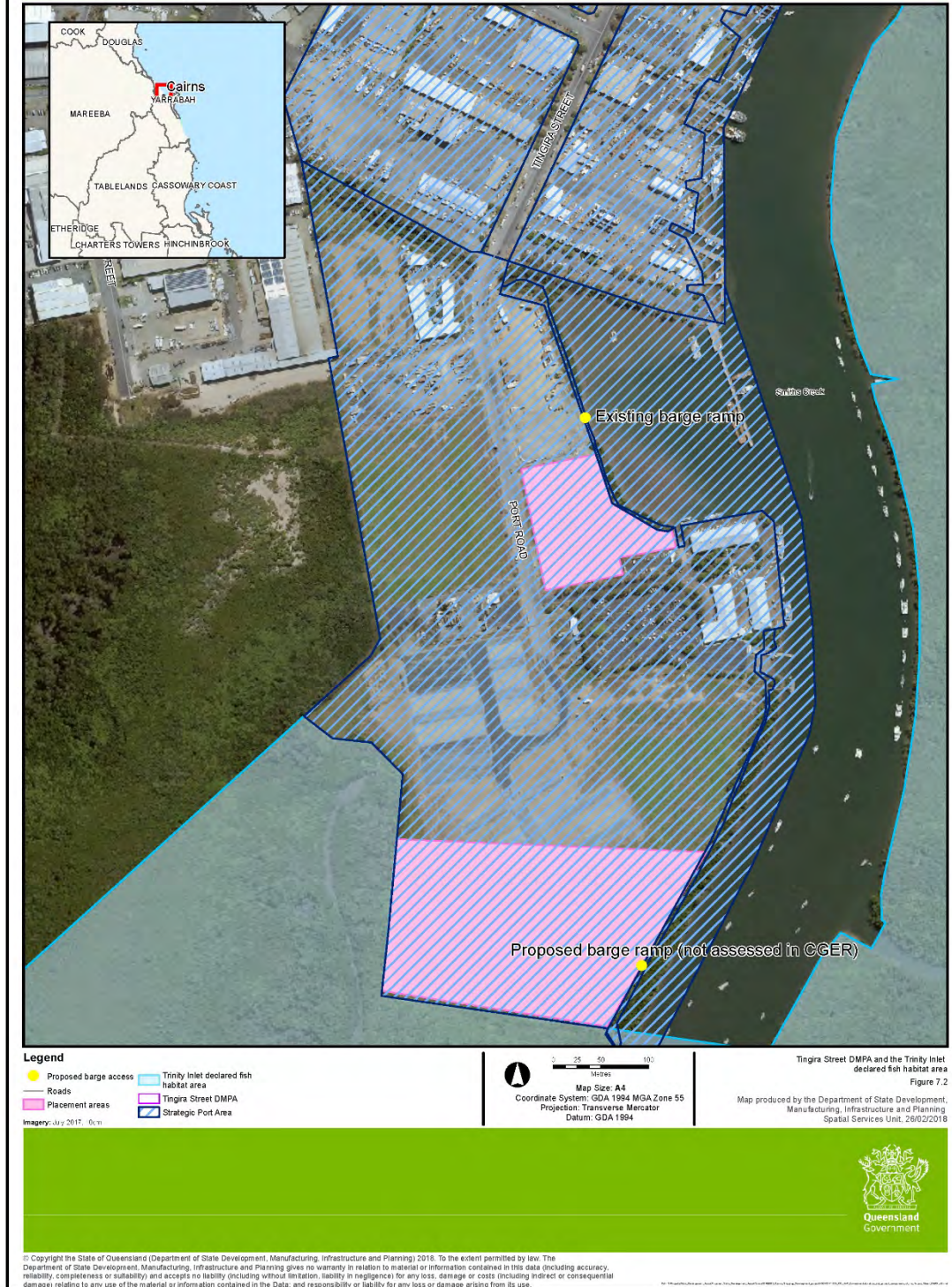
During the pre-construction phase, minor site preparation works involving vegetation clearing would be undertaken. Dozers would be used to lay and spread the stiff clay dredge material across the placement areas, followed by compaction and drying of the material. The thickness of the placed dredge material is anticipated to be up to 3 m.

After placement of dredge material is completed, the DMPA would be used for future port purposes. Any future development at Tingira Street DMPA is subject to separate approval processes and does not form part of this project.



**Figure 7.1 Northern Sands DMPA bund and pipeline layout**





**Figure 7.2** Tingira Street DMPA and the Trinity Inlet declared fish habitat area

## 7.2 Northern Sands DMPA

Activities associated with the onshore placement of dredge material at the Northern Sands DMPA could affect Barron River water quality, groundwater resources, the surrounding areas as a result of flooding, matters of state environmental significance (MSES), state and local roads, sensitive noise and air receptors and Indigenous cultural heritage. My evaluation of these impacts is discussed in the following sections.

### 7.2.1 Existing environment

#### Groundwater

The Northern Sands DMPA currently holds permanent water consisting of stormwater runoff and groundwater, which is tidally influenced by the Barron River. The EIS indicates that the groundwater level at the DMPA is approximately 0 m (Australian Height Datum (AHD)).

There are two major aquifers at the Northern Sands site – an upper aquifer and a lower aquifer, which are separated by a 3–25 m thick clay layer. Only the upper aquifer is connected to the DMPA and is located approximately five metres below ground level. The lower aquifer is confined or semi-confined and is not connected to the water in the DMPA void and is encountered approximately below -20 m AHD.

The upper aquifer is unconfined and varies in thickness from about 2–11 m. A clay layer of various thickness separates the aquifer from ground level. The upper aquifer has a hydraulic conductivity representative of medium to coarse-grained sand (ranging from  $9 \times 10^{-7}$  m/s up to  $2 \times 10^{-3}$  m/s), which facilitates relatively free movement of water through the aquifer. Bores that target the upper aquifer report yields of up to 1500 m<sup>3</sup>/day, where groundwater quality varies from freshwater to brackish water (160 µS/cm and up to 24 000 µS/cm). Groundwater levels in the aquifer vary between -0.3 m and 1.0 m AHD, with bores closest to the Barron River likely to be tidally influenced. Groundwater in the upper aquifer flows towards Thomatis/Richters Creek and the Barron River and is connected to the water in the Northern Sands DMPA void.

There are 24 registered bores within a two-kilometre radius of the Northern Sands site, of which at least seven take water from the upper aquifer. Groundwater from the upper aquifer could be used for irrigation and domestic use. The remaining registered bores are used for water resources investigation or sub-artesian monitoring.

#### Flooding and storm tide

The Northern Sands site is located in a low-lying area on the Barron River floodplain. The Barron River lies to the immediate south and west of the site, and has an average width of about 150 metres (m) with an assumed bed level of -2.0 m below mean sea level AHD. Surrounding land uses predominantly consist of agriculture and residential areas. The EIS documentation identified two residences to the east of the Northern Sands site, with the nearest one being 250 m away. These properties currently experience flooding impacts during Barron River flood events.



The current surface level surrounding the Northern Sands DMPA is typically 2.0 m AHD and ground levels surrounding the site are generally 3.5 m AHD or higher. The adjacent Captain Cook Highway ranges between 3.75 m AHD and 5.0 m AHD.

The climate of the Cairns region and that of the project area is tropical with weather patterns consisting of very wet summers and drier winters. The wet season typically occurs from January to March, while the dry season is typically from May to December. Average annual rainfall for the Cairns region is approximately 2000 mm to 2132 mm in the lower and upper catchments respectively. Flooding occurs most commonly from January to March.

Historical rainfall and flooding data indicates that since 1958, there has not been any peak flows of the Barron River exceeding the 5-year annual recurrence interval (ARI) flood level during the months from May to December (dry season). Comparatively, there have been 14 floods greater than the 5-year ARI levels from January to March (wet season).

A 100-year ARI flood would currently result in a peak water level across the flood plain of approximately 5.42 m, which would likely predominantly affect agricultural land and surrounding residences without over-floor impacts to build structures.

### **Acid sulfate soils**

The Northern Sands site is currently licensed to receive waste and potential acid sulfate soils (PASS). These materials have been placed in the DMPA below the permanent water table. The former Department of Environment and Resource Management (now DES) mapping for ASS (2009) identified the Northern Sands DMPA as 'Disturbed land - likely to contain ASS'. A PASS layer may be found in the sands 4 to 5 m below the surface in the north-western corner of the DMPA and around the southern and eastern areas of the DMPA.

### **Surface water quality and drainage**

Barron River drains into Trinity Bay between the Cairns Airport and the township of Machans Beach. The Thomatis/Richters Creek system forms a major distributary of the Barron River, with the confluence being 9.2 km upstream from the mouth of Barron River. Barron River and Thomatis/Richters Creek are typically subjected to fluctuating salinity levels due to a strong tidal influence and runoff from a predominantly agricultural area. Thomatis and Richters Creek represent the tailwater receiving environment of the Barron River during flooding tides.

The proponent collected baseline water quality data for the Barron River and the upper reaches of Thomatis/Richters Creek near the confluence with the Barron River. This data identifies that median baseline turbidity values for both waterways exceed the current Water Quality Objectives (WQOs) set under the Environmental Protection Policy (Water) 2009 for turbidity in the Barron River Basin. This exceedance is due to the Barron River already receiving runoff from a predominantly agricultural area. Other indicators (dissolved oxygen, pH) were broadly consistent with WQOs.

The proponent collected baseline water quality data for the Northern Sands DMPA void. The void is not included in the 'natural waters' definition of the Barron River Basin under the Environmental Protection Policy (Water) 2009, so WQOs do not apply but the Queensland Water Quality Guideline is applicable. Water grab samples and water quality profiling were collected in July 2016. Background water quality in the void is relatively fresh with neutral pH levels and low concentrations of dissolved metals/metalloids and hydrocarbons, however turbidity levels and nutrient concentrations exceed the Queensland Water Quality Guideline levels at most sample sites.

There is a commercial enterprise that operates an aquaculture facility which intakes and discharges water from Thomatis/Richters Creek upstream from, and just north of the Northern Sands DMPA. The aquaculture water intake is located over 5 km (instream distance) upstream from the tailwater discharge point. This enterprise was considered as a possible adjacent sensitive receptor in the assessment of baseline conditions and environmental values and impact assessments in the EIS documentation.

### Matters of state environmental significance

Estuarine crocodiles (*Crocodylus porosus*) are occasionally found within Lake Narelle at the Northern Sands DMPA. They are common in Cairns and a variety of suitable habitats including mangroves and brackish rivers and creeks are present around the Northern Sands DMPA.

Surveys recorded spectacled flying-foxes (*Pteropus conspicillatus*) foraging in mangroves adjacent to the Northern Sands DMPA. This habitat is not considered to be an ecologically significant location for the species.

### Noise

Existing noise sources surrounding the DMPA consist predominantly of road traffic noise emanating from the Captain Cook Highway, intermittent aircraft noise from Cairns Airport and insect noise. Sensitive receptors include residences located approximately 250 m to the east of the site.

### Air quality

There are seven sensitive receptors near the DMPA. The EIS identified the nearest sensitive receptors are Sensitive Receptor T and U, which are dwellings located approximately 200 m north of the DMPA. The other five sensitive receptors are dwellings located up to 850 m away from the DMPA.

Existing air pollutants surrounding the Northern Sands site are associated with field preparation and sugarcane harvesting, wind erosion of bare soil and occasionally smoke from the burning sugarcane waste. Existing operational activities which influence air quality at the Northern Sands site include vehicle movements on unsealed roads which cause a dust nuisance.

Air pollutants emitted from these activities mostly include carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>), volatile organic compounds (VOCs) (refers to benzene and benzo(a)pyrene) and particulates.

### **Traffic and transport**

The Northern Sands site is accessed from the Captain Cook Highway. The Captain Cook Highway is a state-controlled road (SCR) and a primary route configured to cater for movement of large vehicles.

The SCR is currently configured to service the haulage of heavy vehicles entering and exiting the site.

## **7.2.2 Groundwater**

### **Submissions received**

Submissions received on the EIS documentation identified impacts to the Barron River's water quality as a key issue related to placing dredge material at the Northern Sands DMPA. I have considered all submissions on the EIS documentation in my evaluation of the project.

### **Methodology**

#### **Baseline data**

Baseline groundwater data presented in the EIS documentation included information about groundwater quality, groundwater levels, hydraulic conductivity and geology to form the basis of the conceptual groundwater model and assessment.

The proponent collected baseline data on groundwater quality from 24 registered bores and four monitoring bores, located within a two-kilometre radius of the Northern Sands DMPA site. In 2016, the proponent installed an additional four shallow monitoring bores bringing the total number of monitoring bores to 32. Of the additional four shallow monitoring bores, three were sampled for groundwater quality on 29 September and 22 November 2016, with the fourth sampled on 24 November 2016.

The proponent also collected baseline information about groundwater levels from data recorded at the registered bores between 1976 to 2016; and from data recorded at six monitoring bores between 2009 and 2016. Groundwater levels were also recorded at one-hour intervals from 29 September to 22 November 2016 at the four additional shallow monitoring bores installed by the proponent.

The proponent collected baseline data on hydraulic conductivity at the four additional shallow monitoring bores. Slug tests were carried out at each bore in November 2016 in addition to two falling and two rising head tests. Data was recorded using a pressure transducer to record water levels every second, in conjunction with manual water level measurements during the tests.

Information on geology was collected from data recorded from 46 borehole investigations and 51 cone penetrometer tests undertaken by the proponent and others

since 1995. The results of the geological investigation formed the basis for the conceptual groundwater model.

### **Groundwater model**

The EIS documentation reports that groundwater modelling software (SEEP/W) was used to establish a conceptual groundwater model, predicting the potential impacts on groundwater from placing dredge material at the Northern Sands DMPA. To predict the worst-case scenario, impacts were modelled without mitigation measures. Parameters used in the model were based on groundwater baseline monitoring data and laboratory tests to reflect the groundwater environment as accurately as possible.

Groundwater impacts were modelled on two cross-sections of the Northern Sands DMPA. Section A is a north/south aligned cross-section of the western part of the DMPA and passes through the Barron River and Section B is a north-west/south-east aligned cross-section of the eastern part of the DMPA. Placing dredge material within the Northern Sands DMPA void was modelled to be completed over 84 days. The maximum level of dredge material in the void is modelled to reach 4.07 m AHD and then held at this level for two years. This time period is representative of a worst-case scenario. The model assumed that the dredge material would have a saturated hydraulic conductivity similar to compacted clay ( $1 \times 10^{-8}$  m/s), which would effectively reduce the ability of water to move through the dredge material.

The water level in the DMPA void was modelled to increase to 5.07 m AHD over the 84-day period for the placement of dredge material. It was modelled to be held at this level for two years. The initial salt concentration of the groundwater was modelled to be 1600 mg/L.

### **Impacts and mitigation measures**

#### **Environmental values of groundwater**

The model predicted that placing dredge material in the DMPA void would increase salt concentrations in the upper aquifer due to salt water in the void moving into the groundwater. The predicted changes to salt concentrations is highest at the site boundary and decreases with distance. Increasing the salt concentration of the upper aquifer could affect current and future users of groundwater and other environmental values such as agricultural land and groundwater-associated surface ecological systems including mangroves and samphires.

The proponent confirmed their model predicted that once all the dredge material has been placed in the void (84 days after placement commenced), salt concentrations in groundwater at the Northern Sands site boundary would have increased by 23 800 mg/L over the initial modelled concentration. Changes to salt concentrations in the groundwater are predicted to extend from the DMPA boundary to a maximum distance of 115 m for Section A and 120 m for Section B.

The model also predicted that two years after the completion of dredge material placement, groundwater with an increased salt concentration of 410 mg/L over the initial modelled concentration would extend to a maximum distance of 150 m for both

sections. The predictions are considered to represent the worst-case scenarios since the model did not analyse the mitigating effects of reducing the water level in the void as the dredge material settles to -0.59 m AHD. Lowering water levels in the void would reduce the downward pressure on groundwater and the movement of salt water from the void into the upper aquifer.

Agricultural land (sugarcane) and groundwater-associated surface ecological systems are located within the area where salt concentrations of groundwater are predicted to increase. The agricultural land is located north and east of the Northern Sands site, and the surface ecological systems are located between the void and the Barron River.

Increased salt concentrations in the upper aquifer could negatively impact sugarcane yield if the groundwater reaches the sugarcane's root zone. The EIS documentation considers that sugarcane growing adjacent to the Northern Sands site would be relatively salt tolerant given the existing brackish groundwater environment. The EIS documentation also indicates that the clay layer above the upper aquifer is approximately three metres thick where the sugarcane is located. The likelihood of the Northern Sands site upper aquifer reaching the sugarcane root zone is considered to be low because the clay layer acts as a barrier preventing the groundwater from moving up into the root zone. To confirm the likelihood of this impact, the proponent has committed to:

- investigating the depth of the root zone for existing agricultural land that may be impacted by the project
- modelling without mitigation the vertical extent of increased salinity.

Mangrove and samphire communities growing adjacent to the Barron River along the southern side of the void may also be impacted by the increased salt concentrations in groundwater. However, the species of mangroves and samphires that make up the ecological systems are likely to be relatively salt-tolerant since they would be already affected by the tides in the Barron River. The EIS documentation indicates that increased salt concentrations may influence ecological succession within the surface ecological systems with less salt-tolerant species being replaced by more salt-tolerant species.

The EIS documentation predicts that dredge material placed in the DMPA void would create a barrier between water in the DMPA void and the upper aquifer. The dredge material is expected to settle forming a seal that would prevent salt water moving from the void into the groundwater. This would reduce the predicted increase in salt concentrations in groundwater.

The proponent has committed to manage potential impacts to groundwater quality, agricultural land and groundwater-associated surface ecological systems by:

- minimising pressure on groundwater from water in the Northern Sands DMPA void by adjusting dredge placement and discharge water regimes to manage water levels to be as low as possible
- temporarily reducing pressure on groundwater from water in the DMPA by delaying dredging or prolonging dredging cycles

- intercepting affected groundwater via sheet piling or dewatering
- entering into make-good agreements with affected land owners
- rehabilitating the affected surface ecological systems.

I consider the proposed mitigation measures to be appropriate to provide options to manage the potential impacts to groundwater quality, agricultural land and groundwater-associated surface ecological systems. I have stated a condition for the environmental authority (EA) over the Northern Sands DMPA ensuring no adverse impacts from the project on the environmental values of groundwater outside of the Northern Sands DMPA. I have also stated conditions for the EA requiring the proponent to develop and implement a groundwater monitoring program that will include trigger values for salt concentrations, which if exceeded require the proponent to implement management actions to prevent or minimise off-site migration of salt waters. I have also stated conditions for the EA requiring the proponent to validate the groundwater model as part of developing the groundwater monitoring program.

### **Barron River water quality**

The EIS documentation reported that salt water from the Northern Sands DMPA void could seep into the Barron River via the upper aquifer, possibly increasing the salinity and concentration of metals in the river. Salinity in the Barron River is influenced by the tides and ranges from 5 g/L to 30 g/L.

Modelling predicted that groundwater seepage from the Northern Sands DMPA void to the Barron River could reach a maximum rate of 7400 m<sup>3</sup>/day possibly resulting in a maximum salt flux of 3500 g/s along approximately 1.1 km of the river. However, the river is generally brackish with salinity at about 20 g/L most of the time. To prevent salt water moving into the Barron River from the Northern Sands DMPA, the proponent has proposed to limit the water level in the DMPA until sufficient dredge material has been placed in the DMPA to create a barrier between the DMPA void and the upper aquifer. I consider that this mitigation measure and those proposed to manage impacts to groundwater quality are appropriate to provide options to manage potential water quality impacts on the Barron River from groundwater seepage from the DMPA.

Submissions on the EIS documentation raised issues about potential impacts to the Barron River's water quality from metals potentially becoming soluble and moving out of the DMPA. Mobilisation of metals could occur if the PASS material placed in the DMPA oxidises, generating acid. Metals become soluble in acidic environments. The risk of metals becoming soluble in the DMPA is predicted to be low because water quality tests found that metal concentrations in the water in the existing void were below the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000) trigger levels and that metal concentrations in the dredge material were lower than the respective National Assessment Guideline for Dredging (NAGD, 2009) or local screening levels.

Furthermore, the proponent has committed to ensure that PASS material does not oxidise by placing any dredge material at least one metre below the lowest permanent groundwater table and in the lowest sections of the Northern Sands DMPA. Also, any



PASS material placed above this level would be treated. Additional measures to manage PASS are discussed in Section 7.2.4 (Acid sulfate soils).

I have stated conditions for the EA over the Northern Sands site requiring the proponent to place all dredge material 1.0 m below the lowest permanent groundwater table, and any dredge material placed above 1.0 m must be sampled and tested for ASS and treated, if required, in accordance with the Queensland Acid Sulfate Soil Technical Manual - Soil Management Guidelines (the guideline). I have also stated conditions requiring the proponent to develop and implement a groundwater monitoring program that will include trigger values for salinity and contaminants including metals and metalloids.

### **Coordinator-General's conclusion: Groundwater**

I am satisfied that the proponent has assessed the potential impacts to groundwater from placing dredge material at the Northern Sands DMPA. The assessment predicted that without mitigation the placement of dredge material within the Northern Sands DMPA could affect salt concentrations of groundwater within and surrounding the DMPA. In addition, water quality of the Barron River could be affected if groundwater seepage from the DMPA was to occur.

The proponent has committed to manage groundwater impacts by:

- minimising pressure on groundwater from water in the Northern Sands DMPA
- temporarily reducing pressure on groundwater from water in the DMPA when required
- intercepting affected groundwater via sheet piling or dewatering
- entering into make-good agreements with affected land owners
- rehabilitating the affected surface ecological systems.

In order to ensure that the project has no adverse impacts on the environmental values of groundwater, I have stated conditions requiring the proponent to:

- ensure no adverse impact to groundwater values outside of the Northern Sands DMPA
- provide a detailed description of the groundwater monitoring methodology to develop and implement a groundwater monitoring program
- provide a methodology for validation of the groundwater model
- submit the groundwater monitoring program to DES for approval prior to construction commencing (including 12 months of baseline groundwater data)
- ensure that any dredge material that would not remain saturated must be managed in accordance with the latest version of the guidelines.

I am satisfied that the proposed mitigation measures, proponent commitments and stated conditions would manage groundwater impacts associated with the onshore placement of dredge material.

### 7.2.3 Flooding and storm tide

Impacts to flooding and storm tide from the onshore placement of dredge material at the Northern Sands DMPA was not a key issue raised in submissions received on the EIS documentation. I acknowledge the potential for flooding and storm tide impacts and have considered them in the assessment below.

#### Methodology

The proponent used the TUFLOW two-dimensional flood model to determine the potential impacts resulting from the construction of the temporary bund around the perimeter of the Northern Sands DMPA. The TUFLOW modelling of the Barron River used in the assessment was approved (in a separate assessment) by Cairns Regional Council (CRC).

The EIS documentation assessed the impacts of the project's bund walls on flood levels, afflux and velocities during natural hazards such as extreme rainfall events and flooding. Natural hazards were considered in terms of both annual recurrence interval (ARI) and annual exceedance probability (AEP). ARI is defined as the annual period between flood events of a specified magnitude, expressed in years, while AEP is defined as the probability that an event of a specified magnitude could occur in 1 year. AEP is expressed as a percentage.

Over 150 years of historical rainfall data collected by the Bureau of Meteorology was considered in the evaluation, where records indicate that floods above the 5-year ARI level are unlikely to occur during the dry season, when dredge material will be placed in the Northern Sands DMPA void.

To determine the influence the temporary bund may have to flood flowthrough at the site, the assessment considered design flood events ranging from ARI 2-year flood events through to ARI 100-year flood events, with respect to the known Barron River design flood levels (refer Table 7.1).

**Table 7.1 Design flood levels and likelihood of exceedance for the Barron River (existing conditions) (Source: RDEIS Chapter B17)**

Level (m AHD)	ARI – years	Likelihood of exceedance (%)
4.0	2	39.3
4.6	5	18.1
4.8	10	9.5
5.0	20	49.0
5.3	50	20
5.5	100	1

The potential for remobilisation of the placed dredge material during flooding events was also assessed. The EIS documentation assumed a critical bed shear stress level (the amount of water force that would result in the movement of sediments) of 0.3 newtons (N)/m<sup>2</sup>. The assessment noted that this bed shear stress estimate is consistent with critical bed shear stress recommendations in other recent studies.

## Impacts and mitigation measures

The potential impacts associated with the bund include:

- impacts to flood levels and velocities surrounding the Northern Sands site while the bund is in place
- structural integrity impacts – bund wall failure (collapse and seepage), overtopping and remobilisation of sediment during flooding.

The EIS documentation indicated that the most likely impacts as a result of flooding are typically associated with economic losses due to damage to infrastructure e.g. roads, structures, and loss of sugar cane crops.

### Impacts to flood levels and velocities beyond the Northern Sands DMPA

Following the release of the RDEIS, the proponent conducted an additional assessment as part of a supplementary report to further assess potential flooding impacts. In doing so, the proponent revised the proposed layout for the Northern Sands DMPA. Key differences in the layout of the Northern Sands DMPA are described in Table 7.2.

**Table 7.2 Comparison of RDEIS and supplementary report bund design (Source: RDEIS Appendix AD and Supplementary Report Appendix D)**

Design element	RDEIS design	Supplementary report revised design
Bund height (m)	7.5	5.5 (minimum, may be up to 5.7)
Extent of bund wall	Northern sands area excluding eastern portion (30.16 ha)	Entire northern sands area (34.6 ha)
Total storage (million m <sup>3</sup> )	2.4	2.4
Flood immunity (ARI flood level)	200	100
Emergency response measures	<ul style="list-style-type: none"> <li>• lowering of bund commensurate with surface crusting</li> <li>• adjustable weir to control supernatant water levels</li> <li>• maintaining appropriate level of water above the dredge material to limit remobilisation potential</li> </ul>	<ul style="list-style-type: none"> <li>• spillway</li> <li>• balancing pipes</li> <li>• buffer air space storage allowance</li> <li>• embankment design considerations</li> <li>• dredge material water management strategy</li> </ul>

The proponent has indicated that the placement of dredge material would be completed during the dry season, following which settlement and consolidation is expected to occur.

If the bund remains at the Northern Sands site over the first wet season (January to March) following placement, the assessment predicted that a bund constructed to 5.5 m AHD could influence surrounding flood levels. Table 7.3 presents the potential

impact of the bund on flood levels for ARI 2-year flood levels through to ARI 100-year flood levels.

**Table 7.3 Predicted increase in flood levels (Source: Supplementary Report Appendix D)**

ARI flood level	Barron River/Thomatis Creek confluence flood level impact (mm)	North-east corner of site flood level impact (mm)
2	+3	-22
5	+12	+3
10	+35	-97
20	+53	-184
50	+92	-300
100	+140	-407

For all ARI flood levels assessed, the predicted increase in flood levels identified in Table 7.3 would occur at agricultural land located to the north and east of the Northern Sands site that are already subject to flooding impacts.

The EIS documentation reported that no over-floor flooding would occur at nearby residences for all assessed design flood events (ARI 2-year to ARI-100 year). This includes two highset Queenslander houses located on the western side of Richters Creek and east of the site, adjacent to the Captain Cook Highway near Machans Beach Access Road roundabout. These properties would currently experience flooding impacts during a Barron River flood event. The predicted impacts identified in Table 7.3 do not result in any new flooding impacts for surrounding sensitive receptors.

Positive benefits from the project were also identified at 100 residential properties located to the east of the Northern Sands site within the Holloways Beach township. These properties are expected to have 1 to 4 cm flood level reductions in an ARI 50-year event and 1 to 5 cm reductions in an ARI 100-year event.

In conclusion, the assessment predicted that based on monthly historical flood records, it is expected that there would be very low probability of a flood during the placement period. Further, when compared to the initial bund configuration proposed in the RDEIS, the alternate void and bund configuration did not change the flood impact assessment.

To further reduce the risk of flood impacts during the wet season, the proponent has committed to progressively remove the Northern Sands DMPA bund towards the final level, based on the actual settlement and consolidation achieved and assessment of the potential of resuspension during flooding, prior to each wet season.

I have stated a condition in Appendix 2 as part of the development permit for a material change of use for an ERA requiring the proponent to ensure that the bund shall have a no-worsening impact on flooding and groundwater quality for external properties, unless the impacted land owner(s) provide their consent to impacts.

I have also stated a condition in Appendix 2 requiring the proponent to undertake a Flood Risk Assessment (FRA) of the proposed works and to confirm the:

- flood model used as the basis for the assessment
- potential for the activity to increase property damage in floods and increase flood hazards for the community
- hazard associated with the potential structural failure of the bund
- impact of the activity on the potential for erosion
- potential resuspension risk of the placed dredge material in floods.

The FRA would be subject to review and approval by the Cairns Regional Council. I am satisfied that the conditions would ensure that the project meets the performance outcomes set in the conditions to prevent adverse flooding impacts.

## **Structural integrity impacts**

### *Flood overtopping*

Bund overtopping may occur as a result of floodwaters flowing over the bund walls and into the bund from all sides. To avoid bund wall damage during such an event, balancing pipes are proposed to allow water contained within the bund to rise at the same rate as external waters. Only flow in to the containment area would be permitted, while preventing flow out. This would limit the potential for flood waters to structurally damage the bund wall.

Pipes would be located on the western upstream side of the bund. The final sizing and location of balancing pipes would be determined during detailed design, however 32 pipes one metre in diameter are expected to support the required inflow rate.

The addition of balancing pipes is expected to also limit the potential for scouring (water movement driven sediment removal). Where flood velocities adjacent to or over the bund are predicted to exceed 2 m/s, scouring may also be managed through design elements such as grassing or rip-rap, which is rock or rubble used to prevent scour and erosion.

In order to ensure flood overtopping impacts are appropriately managed, I have stated a condition in Appendix 2 as part of the development permit for a material change of use for an ERA requiring a FRA of the proposed works must be developed and documented to the satisfaction of the Chief Executive Officer of Cairns Regional Council. The FRA report will demonstrate that the project meets the overall objective of reducing environmental harm to as low a level as reasonably possible. I am satisfied that through the proposed mitigation measures and stated conditions that potential environmental harm associated with flood overtopping would be managed.

### *Rainfall overtopping and bund wall integrity impacts and seepage*

An ARI 100-year 72-hour rainfall event could result in 907 mm of rainfall, which has the potential to entirely fill the DMPA if appropriate management is not undertaken to provide sufficient freeboard. Similarly, if the water levels within the DMPA are not appropriately managed during extreme rainfall events, there is the potential for part of the bund wall to collapse.

The assessment noted that the likelihood of a 100-year 72-hour ARI rainfall event occurring in any two-year period is two per cent. This would only occur during the wet season outside of the proposed dredge material placement period (typically from January to March). The buffer volume required to accommodate an ARI 100-year storm was estimated at 263 100 m<sup>3</sup>, requiring containment levels to be maintained at or below 4.5 m AHD during the wet season.

The assessment predicted that the risk of rainfall overtopping is low, and the risk of general environmental harm and general economic loss or property damage is also low.

At its closest point (the north-western corner), the bund is approximately 150 m from the Captain Cook Highway. If a 200 m section of the bund wall was to collapse as a result of poor management during an extreme rainfall event, by the time the banded water reaches the Captain Cook Highway it would have spread 400 m across with a depth of 0.5 m. Sheet flow overtopping of the adjacent Captain Cook Highway is predicted to reach levels of 300 mm at the greatest.

With regards to potential seepage impacts, the assessment noted that the nearest residence is over 250 m away to the east of the site and located on an elevated platform and likely to be above any flow influence. The assessment predicted that the risk of bund wall failure via seepage is low. Failure by seepage would be controlled through design, where stable batters, suitable materials including an impermeable geosynthetic lining and compaction would be applied to reduce risk. The assessment concluded that through design, no further mitigation would be required to address the potential for seepage.

In order to manage the potential risk of rainfall overtopping, the proponent indicated that a dredge material water management strategy would be implemented to ensure that, prior to the wet season, water levels are reduced and maintained at a level that provides sufficient freeboard to accommodate an extreme rainfall event. Further, an armoured spillway and drop structure would be included in the bund design, to protect the integrity of the bund in the unlikely event the bund is full at the start of an extreme rainfall event. The assessment indicated that for a 72-hour probable maximum rainfall event, which could result in 1.9 m of rainfall, a 15 m long by 0.5 m deep emergency spillway would adequately manage any potential impacts. Further refinements would be required during detailed design.

Additionally, small embankment design is expected to manage the potential risk of bund wall collapse. Even under the worst-case scenario event highlighted above, there is no significant risk of loss of life to people driving on the Captain Cook Highway. The assessment concluded that the risk of damage is small and the potential for harm to people is low.

As a possible mitigation measure, a one-metre high earth mound may be constructed along the highway frontage to contain any water and spoil discharged in the event of a bund wall collapse. Procedures may also be implemented to ensure that any site buildings or activities are not located between the bund and the highway, or within 150 m of the bund elsewhere.



I am satisfied that an emergency spillway, in combination with the proposed dredge material water management strategy would ensure that water levels within the void are managed appropriately to accommodate the potential impact of extreme rainfall events and protect against bund wall collapse while the bund is in place. I also consider that a one-metre high earth mound along the highway frontage would assist in mitigating potential bund wall collapse impacts, if required.

In order to ensure that potential rainfall overtopping and bund wall integrity impacts and seepage are managed, I have stated conditions requiring the proponent to:

- undertake a Consequence Category Assessment (CCA) in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (2016). In the event that the Northern Sands DMPA is defined as a regulated dam, the proponent would be required to design and construct the bund wall in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (2016)
- ensure that a minimum freeboard of 600 millimetres must be maintained between the water level in the Northern Sands DMPA and the crest level of the Northern Sands DMPA
- prepare a Flood Risk Assessment (FRA) of the proposed works developed and documented to the satisfaction of the Chief Executive of the administering authority. The FRA report will demonstrate that the project meets the overall objective of reducing environmental harm to as low a level as reasonably possible.

In order to ensure that potential flooding impacts to the Captain Cook Highway are appropriately managed, I have also recommended a condition requiring that, in relation to stormwater management and flood immunity, the proponent must further demonstrate that flood storage, flood velocity and water levels (change in flood height) from the Dredge Material Placement Area (DMPA) associated with this project will have a no-worsening impact or actionable nuisance (impact to health or to the enjoyment of life or property) to the existing and future state-controlled transport corridors (Captain Cook Highway and Cairns Transport Network Busway).

#### *Remobilisation of dredge material during a Barron River flood event*

Following the placement of the dredge material in the dry season, settlement, drying and crusting of the surface is expected to occur. The assessment noted that the potential for remobilisation of sediments reduces significantly with crusting. Settlement of the dredge material is expected to reduce the volume of the placed material by 20 per cent prior to the wet season.

At the start of the 2019/2020 wet season (January to March) the dredge material is expected to lower to approximately RL 3.0 m AHD, which would further lower to RL 0.94 m AHD by the start of the 2020/2021 wet season.

Based on the assumed critical bed shear stress value of 0.3 newtons (N)/m<sup>2</sup>, for an overtopping event with 100-year ARI (5.5 m) bunds in place and with the containment area filled with material to RL 2.69 m, there would only be very minor potential for

resuspension during a flood event. The assessment concluded that the potential for resuspension of dredge materials during a Barron River flooding event is low.

Additional testing of the dredge material will be undertaken during detailed design to determine actual critical bed shear stress and the minimum water depth required to limit the potential for sediment remobilisation.

I am satisfied with the assessment of remobilisation potential provided in the supplementary information provided by the proponent. I note that the proponent has indicated that additional testing of the dredge material will be undertaken during detailed design. This would determine the actual critical bed shear stress and the minimum water depth required to limit the potential for sediment remobilisation. I am satisfied that further assessment during detailed design would enable appropriate management measures are developed to limit the potential for sediment remobilisation, based on the actual critical bed shear stress of the dredge material.

I have stated a condition in Appendix 2 as part of the development permit for a material change of use for an ERA requiring that the release of a contaminant into the environment must not occur.

### Storm tide

The assessment identified that the Northern Sands site is located within the Barron River floodplain, on land that is considered a high storm tide hazard area. Tropical-cyclone generated storm tide probabilities for the general Cairns area are presented in Table 7.4

**Table 7.4 Cairns region tropical cyclone generated storm tide probabilities**  
(Source: RDEIS Table B3-5)

ARI	AEP (%)	Storm tide level (m AHD)
100	1	1.99
200	0.5	2.24
500	0.2	2.65
1000	0.1	3.02

The assessment predicted that the Northern Sands site has the potential to be impacted by storm tide from the Barron River, where a 100-year ARI storm tide level of RL 1.99 m AHD may slightly overtop the existing ground levels (topography surrounding the pit is generally RL 2.0 m AHD) adjacent to the existing void.

The assessment predicted that, in the absence of the influence of climate change, the 5.5 m AHD bund would protect the placed material against storm tide impacts for the 100-year ARI storm surge level of 1.99 m AHD. The bund would also provide protection up to the worst-case and highly unlikely 1000-year ARI storm surge level of 3.02 m AHD. The assessment noted that there is very low likelihood of cyclonic weather

events during the placement of soft clay dredge material at Northern Sands DMPA during the dry season.

The assessment concluded that after the completion of placement, a crust is likely to form over the placed material which would further ensure that the placed material would not be at all vulnerable to storm tide impacts. Accordingly, further mitigation is not required.

The proponent has indicated that the risk associated with storm tide impacts would be managed through ongoing monitoring and early warning of hazardous events, and through an emergency management plan which would include evacuation procedures. The RDEIS concluded that the unmitigated risk of storm tide to the Northern Sands DMPA is negligible, and mitigation would not be required.

Further detailed surveys of the perimeter of the existing void would be required to confirm whether the existing ground levels are at a level that would prevent a 100-year ARI storm surge from entering the pit.

### **Coordinator-General's conclusion: Flooding and storm tide**

I am satisfied with the flooding and the storm tide impact assessments undertaken by the proponent.

I note that the placement of dredge material within the Northern Sands DMPA is proposed to occur within the dry season, and that significant flooding and storm tide impacts are not expected to occur during that time.

I note that in the unlikely worst-case 100-year ARI flood event, the bund would increase flood levels by 140 mm surrounding the Northern Sands DMPA. In lesser flood events (2-year ARI and 5-year ARI), impacts would be lower with flood levels increasing by 3 mm and 12 mm respectively. Despite the potential for impact, no over-floor flooding impacts are expected in nearby residences.

Some positive impacts are also predicted for residences to the east of the Northern Sands DMPA, where the bund may reduce flood levels by up to 10 to 40 mm.

Further, the assessment predicted that use of balancing pipes would manage the potential for overtopping impacts. Balancing pipes would allow internal water levels to rise at the same rate as external floodwaters, limiting the potential for impacts such as erosion to the bund wall during an overtopping event. The assessment also predicted that the potential for resuspension of dredge material during a Barron River flood event is low and that a 5.5 m AHD (approximately 2.5 m above the ground level) bund would protect against storm tide impacts for a 100-year ARI storm tide event.

I expect the proponent to fulfil its commitment to progressively remove the Northern Sands DMPA bund wall prior to the wet season subject to the settlement of the dredge material. This would reduce the potential for flood impacts as a result of the bund wall.

In order to ensure potential flooding and storm tide impacts are identified and managed, I have stated conditions requiring the proponent to:

- prepare a Flood Risk Assessment (FRA) of the proposed works that must be developed and documented to the satisfaction of the Chief Executive Officer of Cairns Regional Council. The FRA report will provide further detail and assessment of the modelling used and the potential flood risk of the project. This would also assist in ensuring the objectives outlined in the conditions for the environmental authority for the Northern Sands site are met. I am satisfied that these conditions would also ensure that the bund is constructed to a height that would provide protection up to a 1000-year ARI storm tide level, which is lower than the 100-year ARI flood level
- undertake a CCA in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (2016)*. In the event that the Northern Sands DMPA is defined as a regulated dam, the proponent would be required to design and construct the bund wall in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (2016)*
- maintain a minimum freeboard of 600 millimetres between the water level in the Northern Sands DMPA and the crest level of the Northern Sands DMPA to ensure that the bund has a no-worsening impact on flooding and groundwater quality for external properties, unless the impacted land owner(s) provide their consent to such impacts.
- ensure the release of any contaminants into the environment must not occur.

I have also recommended a condition requiring that, in relation to stormwater management and flood immunity, the proponent must further demonstrate that flood storage, flood velocity and water levels (change in flood height) from the Dredge Material Placement Area (DMPA) associated with this project will have a no-worsening or actionable nuisance to the existing and future state-controlled transport corridors (Captain Cook Highway and Cairns Transport Network Busway).

I am satisfied that through the mitigation measures identified above, management plans and conditions that potential flooding and storm tide impacts at the Northern Sands DMPA would be managed.

## 7.2.4 Acid sulfate soils

### Submissions received

Submissions received on the EIS documentation identified the following key issues related to acid sulfate soil (ASS) matters:

- the management approach to test, treat and monitor the dredge material and acid sulfate soils at the Northern Sands DMPA site
- issues associated with exposure and subsequent oxidation of potential ASS (PASS).

I have considered all submissions on the EIS documentation in my evaluation of the project.

## Methodology

### Dredge material characteristics

The project involves capital dredging of up to 1 000 000 m<sup>3</sup> of dredge material within the shipping channel and swing basins. A total of up to 900 000 m<sup>3</sup> of soft clay material would be placed at the Northern Sands DMPA. The remaining 100 000 m<sup>3</sup> stiff clay material would be placed at the Tingira Street DMPA.

An assessment of sediment sampling in the shipping channel and swing basins and the testing of material properties were undertaken. The sampling assessment (163 samples at 81 test locations) tested for ASS and identified that approximately 85 per cent soft clay and silts and 15 per cent stiffer clays to be dredged were all of poor engineering quality.

From the sampling undertaken, an assessment calculated the total volume of sediment and mud materials that would be classified as PASS as 320 000 m<sup>3</sup>. The assessment also identified the majority of these PASS materials have sufficient neutralising capacity to be classified as self-neutralising material. The volume of these self-neutralising materials was calculated at 580 000 m<sup>3</sup>. The self-neutralising material contains naturally occurring calcium and magnesium carbonates. These carbonates are able to partially or completely neutralise acidity generated from oxidation of sulphides within the self-neutralising material.

### Impacts and mitigation measures

The proponent has confirmed that the Northern Sands DMPA would be in place temporarily for approximately two years.

### Oxidation of dredge material

There is a potential for PASS material to oxidise when exposed to oxygen through excavation or displacement. Pyrite would oxidise and form sulfuric acid ASS and when combined with water can lead to changes in water quality at the Northern Sands DMPA and which may impact on the surrounding environment.

The relatively stable pH of seawater results in a slow rate of pyrite oxidation. Seawater contains major buffering constituents such as bicarbonate and carbonate and minor acid generated is neutralised almost immediately.

Submissions raised the issue of the oxidation of dredge material occurring during placement phase at the DMPA.

The proponent proposes to place all dredge material within the DMPA at least 1.0 m below the lowest permanent groundwater table. The placement below this level would prevent potential oxidation impacts and would not require treatment to be applied to the dredge material. The EIS documentation indicated that all PASS material underwater would be placed in the deepest areas of the DMPA. Settlement and consolidation of the PASS material would occur for a short period prior to the placement of self-neutralising material over the PASS material.

This approach for all dredge material to be placed 1.0 m below the lowest permanent groundwater table is consistent with the guidelines for the management of PASS materials.

To manage the placed dredged material such that it does not come into contact with air and oxidise, the following additional measures would be implemented:

- dredge material would remain saturated at all times during dredging, delivery and placement phases
- limiting the timing between dredging and placement activities
- dredge material to be strategically placed in deeper areas of the DMPA 1.0 m below the lowest permanent groundwater table
- the balance of material assessed as self-neutralising material to be placed above the PASS material to remove the possibility of future oxidation
- employment of a water cover, of at least 1.0 m in depth to be maintained over the dredged material throughout the placement and post-placement phases to prevent drying.

Submissions were received requiring clarification on the management approach to test and treat placed dredge materials containing ASS. The EIS documentation indicated that there is a risk for acid-producing or untreated finer particles of PASS to be contained within the self-neutralising material. If the dredge material remobilised and settled above 1.0 m below the lowest permanent groundwater table, without mitigation, this material could also potentially oxidise and impact on groundwater quality.

Should any dredge material settle above this level, the material would require sampling and analysis to determine the presence or absence of ASS. If an analysis revealed an exceedance in the acidity content, the dredge material must be treated in accordance with the guidelines.

The EIS documentation reported that if testing detected areas of acid producing PASS material in the self-neutralising material, the proponent would monitor and address this occurrence with mitigation strategies. Such strategies would include the treatment and verification of each volumetric lot should an analysis identify that excess acidity in the material is detected.

The proponent has committed to undertake sampling, testing and management of all material placed above 1.0 m below the lowest permanent groundwater table.

Records to verify volumes of material sampled and treated, neutralising and verification testing of each placed lot of material will also be compiled for the onshore placement and post-placement of dredged material. The proponent, in addition, has committed to prepare an ASS closure and hand-over testing report and to be in accordance with the guidelines. This report will be required to be submitted to DES.

The EIS documentation concluded that the implementation of these management measures would be consistent with the guidelines.



With the implementation of these mitigation and management measures, the EIS concluded that the potential for material to oxidise and or generate acid would be negligible.

I consider the measures to prevent and or control any potential oxidation impacts relating to the placement of dredged material to be adequate. To ensure these measures are managed effectively, I have stated a condition within the EA requiring the proponent to sample, analyse and treat any ASS material that settles above 1.0 m below the lowest permanent groundwater table within the Northern Sands DMPA. The proponent will also be required to prepare and implement an Acid Sulfate Soil Management Plan (ASSMP) for the project.

### **Post-placement impacts**

The proponent is responsible for the management of the DMPA following placement, tailwater discharge and decommissioning of the site. The EIS documentation indicated that after further consolidation and crusting of the dredge material, the environmental management of the DMPA will revert to the current owner who may recommence waste disposal activities at the site.

The potential impact of the upward displacement of placed self-neutralising material and deeper placed PASS material may occur after the completion of the onshore placement of dredged material. If the final post-placement level of the dredge material has not adequately obtained suitable density strength, the placement of waste or other materials could potentially cause disturbance of the placed material.

To manage any future placement activities on the final placement level of the dredge material, the proponent would be required to measure the final post-settlement bulk density in accordance with *Australian Standard 1141-2009 Methods for Testing and Sampling Aggregates* to ensure no displacement occurs. I have stated a condition in Appendix 2 as part of the development permit for a material change of use for an ERA requiring the proponent to obtain approval from CRC.

I am satisfied that appropriate measures would be applied during the decommissioning (post-placement) phase by the proponent to ensure any potential displacement impacts are adequately managed.

### **Coordinator-General's conclusion: Acid sulfate soils**

I consider that the proponent has assessed potential impacts that would occur as a result of the onshore placement of dredged material. The EIS documentation indicated that without appropriate management, there is the potential for material to oxidise and or to generate acidic conditions, resulting in potential impacts to surrounding environmental values including groundwater resources.

I consider that the proponent has undertaken an adequate acid sulfate soil assessment consistent with the guidelines.

The proponent has committed to manage the placement of dredge material by:

- placing dredge material at least 1.0 m below the lowest permanent groundwater table and designated PASS material in the lowest sections of the DMPA

- sampling and testing all dredge material placed above 1.0 m below the lowest permanent groundwater table and managed in accordance with the guidelines
- preparing an ASS closure report and hand-over testing in accordance with the guidelines.

In order to ensure that the project has no adverse impacts on the surrounding environmental values and groundwater resources, I have stated conditions requiring the proponent to:

- prepare and implement an ASSMP in accordance with the guidelines and submit to DES at least 50 business days prior to the commencement of the placement activities
- ensure that any dredge material placed above 1.0 m below the lowest permanent groundwater table is sampled and analysed in accordance with the guidelines
- ensure that dredge material placed above 1.0 m below the lowest permanent groundwater table with an exceedance in acidity content is treated and managed in accordance with the guidelines
- submit the ASS closure report and hand-over testing to DES for approval within two years of the completion of the dredge material placement
- submit a report to CRC to validate the settlement of the dredge material in accordance with the Australian Standards
- ensure that at water cover, of at least 1.0 m in depth is maintained over the placed dredge material.

I am satisfied that through commitments, mitigation measures outlined in the ASSMP, and stated conditions would ensure that potential impacts resulting from the placement of dredge material at the Northern Sands DMPA can be managed effectively.

## 7.2.5 Surface water quality and drainage

### Submissions received

Submissions received on the EIS documentation identified the following key issues related to surface water quality and drainage matters at the Northern Sands DMPA:

- dredged material settling timings and potential tailwater impacts on surface water quality
- Barron River turbidity impacts and potential for more suspended soils to be discharged than modelled
- confirmation of which tailwater discharge point location preferred
- treatment regime for tailwater discharge
- proposed water contaminant limits at the tailwater discharge site and downstream monitoring sites
- detail on the proposed Technical Advisory Committee, in relation to setting management trigger guidelines and reporting

- potential tailwater discharge impacts on surface water quality of Thomatis/Richters Creek and Barron River and possible effects on commercial operations.

I have considered all submissions on the EIS documentation in my evaluation of the project.

## Methodology

Historical data for surface water quality was collated and presented in the EIS documentation which included a combination of previous assessments, desktop studies and modelling using new data. Information on ground conditions from the current studies and from historical investigations in the vicinity was also collated.

- Baseline water quality data was collected by the proponent for dry and wet seasons and under different tidal conditions including previous project assessments in 2013-2014 and data from maintenance dredging water quality monitoring until 2013.
- Further water quality data was collected between July 2016 and March 2017 in areas where potential impacts from proposed tailwater discharge could occur, including:
  - Barron River – the tailwater receiving environment for the Northern Sands DMPA
  - Thomatis/Richters Creek – a potential tailwater receiving environment due to interaction with the Barron River during flooding tides
- key water quality parameters tested included physico-chemical, TSS and turbidity, Photosynthetically Active Radiation (PAR), metals, nutrients, oil and grease.
- Tailwater modelling was undertaken to identify the extent of potential water quality impacts of tailwater release on the Barron River and Thomatis/Richters Creek:
  - likely worst-case tailwater discharge scenario was modelled, which assumes the upper range of tailwater discharge volume based on the upper range of expected dredge material volumes
  - Modelling was based on constant release of one cubic metre of tailwater per second at 35 Practical Salinity Unit (PSU) and 100 mg/L TSS into the Barron River
  - Modelling outputs were provided for turbidity and salinity
- A risk-based approach has been used to assess water quality impacts, considering the consequence, duration and likelihood of impacts to provide a risk rating.
- Assessment of potential turbidity impacts were developed using a 'zones of impact' method (refer Table 5.2), which is recommended by the Commonwealth EIS Guidelines and the Great Barrier Reef Marine Park Authority (GBRMPA) Modelling Guidelines for dredging environmental assessments.
- the significance of the tailwater discharges in terms of salinity impacts was interpreted using contour plots (showing the change to salinity due to tailwater discharges) and time series graphs instead of zones of impact as used for turbidity.

## Impacts and mitigation measures

### Surface water quality

The EIS presented modelling of surface water quality impacts associated with two tailwater discharge points:

- Discharge point A – adjacent to the DMPA
- Discharge point B - located near the Captain Cook highway bridge, approximately 2.5 km downstream of the DMPA.

As a result of the EIS assessment and analysis and supplementary material discharge point B (DPB) is the preferred option. Impacts predicted for tailwater releases at DPB are considered further below. Discharge point A is not considered further in this evaluation report.

The predicted zone of influence for turbidity impacts associated with tailwater releases from DPB extends up the Barron River to alongside the DMPA, and down to near the mouth of the Barron River. There are no zones of low to moderate impact, or zones of high impact, predicted in the receiving waters.

Tailwater discharge is predicted to increase salinity by about 1-3 parts per thousand (ppt) above variable background levels. The extent of increase is relatively minor in the upper reaches of the Barron River and Thomatis/Richters Creek (increases of approximately 7 to 25 per cent) and almost imperceptible in the lower reaches of the Barron River.

Salinity changes are less pronounced in the lower reaches of the Barron River as the ambient salinity is higher in this area. Conversely, salinity changes further upstream are more pronounced as ambient salinity is lower upstream of DPB.

Submissions raised issues regarding the potential for scouring of sediment around the tailwater release pipe at the bank of the Barron River impacting on water quality, and the need for rehabilitation of the site following removal of the pipe. The RDEIS reported that these impacts could be managed by locating the discharge point sufficiently far from the Barron River bank or by providing adequate rip-rap scour protection where discharge may impinge on erosion prone sediments. During the detailed design phase of the project, outfall scour protection would be confirmed and relevant rehabilitation plans would be prepared. The proponent has advised that this information would be provided as part of the Operational Works development application for Prescribed Tidal Works.

The commercial operation with a water intake located on Thomatis/Richters Creek is beyond the predicted zone of influence or impact for turbidity. Potential impacts on salinity are predicted to be between 0-1ppt. In the upper reaches of Thomatis/Richters Creek, ambient salinity is up to around 14 ppt. Tailwater discharges are predicted to increase this salinity by less than 1 ppt for DPB, representing an increase of approximately 7 per cent. The relatively minor salinity increases from tailwater discharges pose minimal risk to the salinity regime of these waterways, particularly considering the short-term duration of tailwater discharge (approximately 10 weeks). Furthermore, as dredging and tailwater discharges are proposed to occur during the

dry season when there are less freshwater flows, ambient salinity would be expected to be higher. Tailwater salinity would therefore be likely to have less impact during this period.

The EIS assessment concluded that potential residual impacts to surface water quality due to tailwater discharge from at the Northern Sands DMPA are expected to be short-term and minor. The short-term and minor impacts on surface water quality mean that negligible impacts are predicted to marine water quality for coastal waters into which the Barron River and Thomatis/Richters Creek discharge, including the Great Barrier Reef Coast Marine Park.

Potential impacts from tailwater discharge on water quality associated with placement of dredge material at the Northern Sands DMPA would be addressed by implementation of a Dredge Management Plan (DMP) for project activities. Mitigation measures identified in the draft DMP include:

- an adjustable weir (e.g. drop-board weir box) will be used to control water levels and may pass through a final pumping pond prior to its release as tailwater. The weir box typically has boards that can be added or removed to set the height of the overflow (and hence water levels) inside the DMPA and is used to control tailwater quality
- a temporary 5 ha tailwater treatment pond may also be constructed on site depending on the outcome of further detailed design
- treatment of tailwater prior to release to meet water quality discharge performance requirements
- investigation of correlations between turbidity and suspended solids (TSS) to develop an operational indicator of suspended solid concentration that can be field measured.
- surface water quality performance triggers are to be set for receiving water quality values potentially affected by DMPA tailwater based on the 12 months of data collected as part of the Revised Draft EIS and subsequent data collected prior to commencement of the work. The proposed process to establish trigger levels is outlined in the DMP.

Monitoring of surface water quality associated with tailwater release is proposed within the DMP at:

- the weir gate within the dredge placement ponds and/or tailwater pond(s) within the DMPA
- the return pipeline discharge point into the Barron River
- locations upstream and downstream of the discharge point in the receiving environment in the Barron River and Richters/Thomatis Creek systems.

A Tailwater Management Reactive Monitoring Program (RMP) would be prepared to address the release of dredge tailwater from the Barron River DMPA. This monitoring program is proposed to be overseen by a technical advisory group (TAG). The RMP will consist of a surface water quality monitoring program for monitoring sites at the pipeline discharge point DPB and at locations upstream and downstream of DPB in the receiving environment in both the Barron River and Richters/Thomatis Creek systems. Monitoring data would be collected and downloaded regularly and the data assessed

against threshold triggers, with appropriate management actions implemented if threshold triggers are exceeded.

I have stated conditions for inclusion in the EA for ERA16 for placement of dredge material at Northern Sands DMPA in Appendix 2. These stated conditions set limits on water quality parameters for released tailwater, and regulate tailwater management measures.

### **Surface water drainage**

The main surface water impacts associated with the project is the potential for erosion, release of sediment and surface water drainage run-off from the DMPA site during the pre-construction, construction and disestablishment phases.

These impacts during these phases would be managed by constructing the bund area during the dry season (May to November) or during low rainfall conditions.

To reduce potential impacts, the proponent would implement stormwater management measures including:

- Diversion of clean stormwater away from the DMPA and tailwater bund footprints prior to commencement of construction
- Installation of sediment fencing around all material stockpiles and contractor's laydown site
- Installation of rock shaker pad at the DMPA site's access
- Batter and crest stabilisation of the bunded area
- Regular monitoring and maintenance.

Any potential surface water drainage impacts associated with bund construction and when placement activities commence would be mitigated by implementing best practice erosion and sediment controls. The EIS documentation concluded that the potential impact of the release of sediment and stormwater water from the DMPA during the pre-construction, construction and disestablishment phases was negligible.

### **Coordinator-General's conclusion: Surface water quality and drainage**

#### **Surface water quality**

I am satisfied that the proponent has assessed the potential tailwater discharge impacts associated with Northern Sands DMPA.

The assessment predicted that the discharge of tailwater would increase salinity by about 1-3 ppt above variable background levels. The extent of increase would be relatively minor in the upper reaches of the Barron River and Thomatis/Richters Creek and almost undetectable in the lower reaches of the Barron River, as the ambient salinity is higher in this area. There are no zones of low to moderate impact, or zones of high impact, predicted in the receiving waters.

The EIS documentation concluded that potential impacts to marine water quality due to tailwater discharge from at the Northern Sands DMPA are expected to be acceptable. Potential impacts from tailwater discharge on water quality associated with placement of dredge material at the Northern Sands DMPA would be addressed by



implementation of a DMP for project activities. A Tailwater Management Reactive Monitoring Program (RMP) would also be prepared to address the tailwater discharge from the Northern Sands DMPA. This monitoring program is proposed to be overseen by the technical advisory group (TAG).

I have stated conditions setting water quality release limits and monitoring requirements to ensure that the environmental values of the Barron River are not adversely affected.

I am satisfied that the mitigation measures, management plans and stated conditions would ensure that potential impacts resulting from the discharge of tailwater from the Northern Sands DMPA would be managed effectively.

I note that the on-shore placement of capital dredge material at the Northern Sands DMPA is consistent with the SPD Act and Reef 2050 which prohibit sea-based disposal and mandates disposal of dredge spoil on land. Similarly, capital dredging within the regulated port limits of Cairns Port is anticipated by Reef 2050.

### **Surface water drainage**

I am satisfied that the proponent has assessed the potential surface drainage impacts associated with placement of dredge material at the Northern Sands DMPA. The EIS documentation concludes that the implementation of a stormwater management plan will effectively manage the impacts resulting from the placement of dredge material at the Northern Sands DMPA.

To ensure impacts are adequately managed, I have stated a condition (Appendix 2) in the EA for the proponent to develop, implement and maintain erosion and sediment controls for the Northern Sands DMPA. I require these measures to be in accordance with the Best Practice Erosion and Sediment Control Guidelines for Australia (International Erosion Control Association, 2008).

## **7.2.6 Matters of state environmental significance**

Impacts to MSES from onshore placement of dredge material at the Northern Sands site was not a key issue raised in submissions received on the EIS documentation. I acknowledge the potential for impacts to MSES and have considered them in the assessment below.

### **Impacts and mitigation measures**

#### **Protected wildlife**

The following protected wildlife species potentially affected by placing dredge material at the Northern Sands DMPA are listed as vulnerable under the *Nature Conservation Act 1999* (NC Act).

#### *Estuarine crocodile*

While crocodiles are sometimes found in Lake Narelle, it is an artificial environment and not core habitat for the species. Lake Narelle is within an active removal zone

under the Queensland crocodile management plan (2017). Animals are generally trapped and removed by National Parks and Wildlife Service officers.

Crocodiles in Lake Narelle could be disturbed by activities involved in placing dredge material within the lake. To prevent potential impacts and disturbance to crocodiles that might use Lake Narelle, the proponent has committed to reduce the accessibility of the lake to crocodiles by designing the lake edges to be steep or vertical. This does not conflict with the objectives of the Queensland crocodile management plan.

I am satisfied that the proposed measures will prevent crocodiles from entering Lake Narelle, and therefore preventing potential project impacts on the species.

### *Spectacled flying-fox*

Artificial lighting for night works at the Northern Sands DMPA could reduce the appeal of potential spectacled flying-fox foraging habitat adjacent to the DMPA. Spectacled flying-foxes are less likely to forage in habitat that is illuminated by artificial lighting. Night works at the Northern Sands DMPA are proposed to last for 60 nights. To minimise potential impacts to spectacled flying-foxes, the proponent has committed to complete night works outside of the species' breeding season (spring–summer) where practicable.

The potential habitat in this location is not considered to be an ecologically significant location for the species. Furthermore, potential foraging habitat for the species is widespread in and around Cairns.

I am satisfied that the potential impact to the species would be low, and that the proposed measure would be adequate to manage the impact.

To further reduce any potential impacts from the project on spectacled flying-foxes, the proponent has committed to ensure that any new fences constructed for the project will have a plain wire as the top strand rather than barbed wire. Barbed wire is listed as a threat to the species in the Species Recovery Information Gateway database managed by DES.

I consider this is an appropriate and adequate mitigation measure to reduce threats to the species identified in the Species Recovery Information Gateway database.

### **Coordinator-General's conclusion: Matters of state environmental significance**

I note that placing dredge material at the Northern Sands DMPA will not result in significant residual impacts to MSES. The potential habitat at the Northern Sands DMPA is not considered to be an ecologically significant location for listed species.

As identified in Section 7.2.5, no adverse impacts are predicted to marine water quality as a result of tailwater discharge, including the Great Barrier Reef Coast Marine Park.

I am satisfied that the proponent has assessed project impacts on MSES and that the proposed commitments and mitigation measures are appropriate to manage impacts on MSES.

## 7.2.7 Noise

Impacts to noise from onshore placement of dredge material at the Northern Sands DMPA was not a key issue raised in submissions received on the EIS documentation. I acknowledge the potential for noise impacts and have considered them in the assessment below.

### Methodology

The proponent conducted background noise monitoring at sensitive receptors located near the Northern Sands DMPA site and proposed tailwater pump location. Data was gathered in accordance with the DES Noise Measurement Manual (2013).

In the absence of Queensland construction noise criteria, the NSW Department of Environment and Climate Change 'Interim Construction Noise Guideline' (2009) (ICNG) was used to develop noise level targets for the project. The ICNG recommends management levels for noise at residences and how they are to be applied, including the highly noise affected level (75 dB(A)) above which there may be strong community reaction to noise. These targets were developed based on the existing background noise levels and are represented by the rating background level (RBL).

The assessment considered a best-case and worst-case scenario, where the best case assumes wind speeds of zero metres per second with 60 per cent humidity, while the worst case assumes wind speeds of two metres per second with 80 per cent humidity. The worst-case scenario is representative of a conservative assessment with potential impacts likely to be lower than predicted.

### Impacts and mitigation measures

The Northern Sands DMPA would operate throughout the duration of capital dredging works (12 weeks), and would be in operation 24 hours per day, seven days per week. The main source of noise generated at the DMPA during construction would be emissions from the tailwater discharge pump, which will transport water that collects on top of the placed dredge material to the Barron River.

The EIS assessment assumed a sound power level of 90 dB(A) $L_{eq}$  with a standard acoustic enclosure providing 10 dB(A) attenuation, and that the tailwater discharge pump would be operating continuously. Based on the assumed locations for the tailwater pump at the southern end of the Northern Sands DMPA, the noise generated would not generate noise above the night time noise level target of 40 dB(A) prescribed by the ICNG at any of the identified sensitive receptors, during both best-case and worst-case conditions.

Further, the assessment noted that noise to be produced from the placement of dredge material from the delivery pipeline to the Northern Sands DMPA is unlikely to result in significant noise impacts.

Once the type and exact location of the tailwater discharge pump is known, further assessment or noise impacts and mitigation would be required. If further impacts are identified, additional mitigation measures could include:

- enclosing the pump/s with an acoustically robust enclosure
- installing temporary noise barriers or earth bunding
- locating the pump/s away from sensitive receptors
- using smaller pumps in series or selecting quieter or over-specified plant.

The proponent has made a commitment to undertake further noise impact assessment, once the final location of the Northern Sands DMPA tailwater discharge pump is known.

### **Coordinator-General's conclusion: Noise**

I note that the assessment predicted compliance with the ICNG noise targets, and that noise produced through the placement of dredge material from the delivery pipeline within the DMPA would not be significant.

I expect that the proponent fulfils their commitment to undertake further assessment once the final location of the Northern Sands DMPA tailwater discharge pump is known.

I have stated conditions in Appendix 2 of the EA for the Northern Sands DMPA setting noise limits and requirements for noise monitoring to ensure that noise associated with the placement of dredge material at the Northern Sands DMPA is managed to avoid nuisance to sensitive receptors.

I am satisfied that the mitigation measures and stated conditions outlined in the EIS documentation would ensure potential noise impacts associated with the onshore placement of dredge material at the Northern Sands DMPA site is managed appropriately.

## **7.2.8 Air quality**

Impacts to air quality from onshore placement of dredge material at the Northern Sands DMPA was not a key issue raised in submissions received on the EIS documentation. I acknowledge the potential for air quality impacts and have considered them in the assessment below.

### **Impacts and mitigation measures**

#### **Pre-construction and construction impacts**

Sources of air pollutants include:

- exhaust emissions from plant equipment
- dust from vehicle movement on unsealed roads
- dust from exposed soil under high wind conditions from DMPA site preparation, tailwater discharge pipeline construction and deconstruction activities and restoration of disturbed areas.

The EIS documentation proposes the Northern Sands DMPA operations to be undertaken 24 hours per day, seven days per week for 12 weeks. The construction of the dredge material delivery pipeline and preparation of the Northern Sands DMPA will

be undertaken concurrently, during daylight hours for up to 6 weeks. The deconstruction of the dredge material delivery pipeline will be undertaken during daylight hours for up to 6 weeks following completion of placement of dredge material.

#### *Air pollutants*

Site preparation of the Northern Sands DMPA involves bunding of the existing void where dredge material is proposed to be placed and construction of a rock lined wall between the DMPA and existing Northern Sands quarry operations. The EIS air quality assessment found all concentrations of pollutants are below the air quality objectives during site preparation.

While the soft clay is being placed in the DMPA, the EIS air quality assessment concluded that unmitigated soft clay placement activities may result in exceedances of air quality objectives for 1-hour NO<sub>2</sub> at SR M, SR W or SR X. SR M is a dwelling located approximately 300 m east of the pipeline, SR W and SR X are dwellings located approximately 300 m east of the Northern Sands DMPA. The EIS predicted the maximum concentration of 1-hour NO<sub>2</sub> would be 356 µg/m<sup>3</sup>, which is above the air quality criteria of 250 µg/m<sup>3</sup>. I note the exceedance is based on the assumption that the tailwater pumps have no SCR emission controls.

To mitigate potential 1-hour NO<sub>2</sub> exceedances, the proponent proposes to ensure the tailwater pumps have exhaust stacks at least four metres high and be fitted with SCR emission control technology. With the application of SCR emission controls, the nearby sensitive receptor would potentially experience 36 µg/m<sup>3</sup> of NO<sub>2</sub>, which is well within the air quality criteria. The concentrations of all other pollutants are expected to be less than the criteria.

#### *Odour*

The dredge material will be delivered in a sealed pipeline, discharged underwater and remain underwater at the DMPA to prevent oxidation of pyrite and odour emissions. The EIS documentation found that odour from the discharge of dredge material from the pipeline is expected to be highest at the outlet where agitation of the surface may occur. The EIS documentation concluded odour is unlikely to be detected at nearby sensitive receptors as the discharge point is greater than 200 m from nearby sensitive receptors and the outlet would be kept below the water surface.

To ensure that sensitive receptors do not experience air quality impacts, I have stated conditions in Appendix 2 that the project must not cause environmental nuisance. I am satisfied the proposed mitigation measures and proponent commitments would be adequate to manage the potential air quality impacts on sensitive receptors surrounding the Northern Sands DMPA.

### **Construction mitigation measures**

In addition to the specific mitigation measures listed above, the CEMP will include standard mitigation measures, which include:

- dust and wind will be monitored onsite and work that may generate dust will cease if strong winds occur

- all project personnel will receive training in air quality control practices
- water carts, sprinklers, sprays and dust screens will be used where appropriate to control dust emissions from exposed surfaces and dust generating activities at a frequency appropriate to conditions
- rumble grids and coarse aggregate will be installed at exit roads to prevent soil being deposited into public roads
- manual cleaning of vehicles and roads will be conducted as required
- construction equipment will be properly maintained to ensure exhaust emissions comply with relevant standards
- drop heights from trucks will be less than two metres
- truck loads are to be covered
- any complaints from the public are to trigger investigation by the operator to determine appropriate control measures.

### **Coordinator-General's conclusion: Air quality**

Based on the results of predicted modelling undertaken in the EIS, I am satisfied that air quality impacts resulting from the project's placement activities can be suitably managed. To ensure that sensitive receptors do not experience air quality impacts, I have stated conditions in Appendix 2 that the project must not cause environmental nuisance.

I am satisfied that the mitigation measures and stated conditions outlined in the EIS documentation would ensure air quality impacts associated with the onshore placement of dredge material at the Northern Sands DMPA are managed appropriately.

## **7.2.9 Traffic and transport**

Impacts to traffic and transport from onshore placement of dredge material at the Northern Sands DMPA was not a key issue raised in submissions received on the EIS documentation. I acknowledge the potential for traffic and transport impacts and have considered them in the assessment below.

### **Methodology**

The traffic assessment undertaken described the potential impacts of construction traffic on the existing road network. This assessment was undertaken in accordance with the then *Guidelines for Assessment of Road Impacts of Development 2006* (GARID). The EIS indicates the modelling assessed intersections where project-related volumes are predicted to be 5 per cent or greater than background traffic. The GARID states that, in general, a development's road impacts are considered to be insignificant if the development generates an increase in traffic on the surrounding road network of no more than 5 per cent of background traffic levels.

The assessment considered impacts on the existing road network from traffic associated with the movement of heavy vehicles to and from the DMPA sites. Traffic generated during the pre-construction, construction and decommissioning phases across both DMPA sites were also considered.



The EIS also undertook a Sidra<sup>28</sup> analysis to investigate the impact of the manoeuvrability and turning through intersections of B-double vehicles that would be used for transporting plant equipment.

### Impacts and mitigation measures

The road transportation of heavy plant equipment for bund preparation works could temporarily affect the local and state-controlled road network. The EIS documentation estimates that a total of 48 heavy vehicle trips would be generated during the pre-construction and decommissioning phases relating to the bund construction and removal over a six-week period for both phases.

The EIS documentation noted that materials from an on-site quarry operation would be used for bund construction. The existing access into the DMPA has the capability requirements to allow safe movement of heavy vehicle traffic and additional vehicles during all phases of the project.

The EIS found that the road network would be able to accommodate the project's heavy vehicle movements including manoeuvring and turning that would not significantly impact the configuration and capacity of the state and local road network.

To ensure the project does not result in unacceptable impacts on the local and state-controlled network, the following measures would be implemented:

- haulage of heavy equipment would be under escort in line with DTMR's requirements
- consultation with DTMR and CRC to provide details of haulage routes and escort requirements
- details confirming heavy vehicle manoeuvrability through intersections.

The EIS concluded that the potential impact of project-related traffic generation associated with the all these phases were not greater than the five per cent baseline under the GARID and therefore a further assessment was not triggered.

To mitigate potential impacts of the project on the state-controlled and local road network, the proponent has committed to develop and implement a TMP in consultation with DTMR and CRC. Through the TMP, I consider that this would address road use at the DMPA site access areas and heavy vehicle haulage movements.

I am satisfied that appropriate traffic controls would be applied to manage and permits from CRC and DTMR would be sought by the proponent for transporting heavy plant and equipment.

### Coordinator-General's conclusion: Traffic and transport

I note that the usage of the road network is expected to result in a minor increase in traffic and is unlikely to be an adverse impact to and from the DMPA site. The EIS documentation identified that safe access to the DMPA site can be adequately

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<sup>28</sup> The meaning of, and requirements for, a Sidra analysis are located at <https://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Guide-to-Traffic-Impact-Assessment>

provided to allow the transportation of heavy vehicles and daily movements of staff and service vehicles.

I have recommended a condition for the proponent to prepare a heavy vehicle haulage management plan and to consult with DTMR, CRC and the Queensland Police Service regarding road haulage routes and escort requirements prior to commencing construction. I am satisfied that a TMP, a heavy vehicle haulage management plan and recommended conditions would ensure the potential issues at the Northern Sands DMPA regarding the facilitation of safe access and egress of heavy vehicles are appropriately managed.

## **7.2.10 Aboriginal and Torres Strait Islander cultural heritage**

Impacts to Aboriginal and Torres Strait Islander cultural heritage from onshore placement of dredge material at the Northern Sands DMPA was not a key issue raised in submissions received on the EIS documentation. I acknowledge the potential for impacts to Aboriginal and Torres Strait Islander cultural heritage and have considered them in the assessment below.

### **Impacts and mitigation measures**

The EIS documentation identified a possible Yirrganydji campsite near the Northern Sands DMPA. The location of the campsite, as inferred from oral history, is along the bank of Thomatis Creek at the confluence with the Barron River. The exact location was not confirmed in the EIS documentation.

Activities involved in placing dredge material at the Northern Sands DMPA are not expected to encroach on the Thomatis Creek bank. Therefore, direct impacts from the project to the campsite are unlikely. To ensure that potential impacts to the campsite are avoided, the proponent has committed to maintain an 80 m buffer between the Northern Sands DMPA activities and Thomatis Creek. The adequacy of this buffer will be confirmed in consultation with Yirrganydji representatives.

In accordance with the ACH Act, the proponent is required to prepare a CHMP in consultation with the Yirrganydji people. The CHMP would prescribe the measures to manage any potential impacts to the campsite and any other places or artefacts of cultural heritage significance to the Yirrganydji people.

### **Coordinator-General's conclusion: Aboriginal and Torres Strait Islander cultural heritage**

I am satisfied that the proponent has adequately investigated and assessed potential impacts on Aboriginal cultural heritage from activities involved in placing dredge material at the Northern Sands DMPA. The assessment predicted that activities involved in placing dredge material at the Northern Sands DMPA are not expected to encroach on the Thomatis Creek bank, where a possible Yirrganydji campsite may be located.

I note that the proponent has started engaging with the relevant Aboriginal parties and will develop CHMPs with each affected party. The proponent is required to develop a

CHMP in accordance with the ACH Act. All CHMPs must be registered with DATSIP before DES can issue the environmental authority for capital dredging and placing dredge material at the Northern Sands DMPA.

I am satisfied that potential Aboriginal and Torres Strait Islander cultural heritage impacts associated with the onshore placement of dredge material at the Northern Sands DMPA would be managed appropriately through a CHMP.

## 7.3 Tingira Street DMPA

Activities associated with the onshore placement of dredge material at the Tingira Street DMPA could affect matters of state environmental significance (MSES), surface water quality, state and local roads and sensitive noise and air receptors. My evaluation of these impacts is discussed in the following sections.

### 7.3.1 Existing environment

#### Matters of state environmental significance

The Beach stone-curlew (*Esacus magirostris*) and Latham's snipe (*Gallinago hardwickii*) were recorded at the Tingira Street DMPA during surveys for the EIS. The northern placement area, which contains marine plants including tidally-influenced vegetation and mangroves, could provide potential habitat for the shorebirds. The southern placement area, which contains grassland, could also provide potential habitat for the Latham's snipe. Both species are listed under the NC Act – the Beach stone-curlew is listed as vulnerable and the Latham's snipe is listed as special least concern. The Latham's snipe is also listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, and will be considered by the Commonwealth DEE as a matter of national environmental significance.

The Trinity Inlet declared fish habitat area (FHA) is 7212 ha and covers the Trinity Inlet and Trinity Bay except for the Cairns Port area and shipping channel. The mangroves growing on the south and southwestern boundary of the Tingira Street DMPA are located within the management B area of the FHA. Management B areas provide a buffer, enhancing protection for key fish habitats in management A areas.

#### Acid sulfate soils

The Department of Natural Resources and Mines mapping for ASS (2016) identified areas within the Tingira Street DMPA to have PASS starting in the top 0.5 m of the surface. A PASS layer may be found in the existing soft clays that lay underneath the reclaimed filling area at the DMPA.

#### Noise

The noise sources surrounding the DMPA includes road and boat traffic noise, forklifts, cranes and other plant operating on nearby industrial properties. The EIS identified a college and office buildings as the nearest sensitive receptors that may be affected during the daytime period only.

## Air quality

There is one sensitive receptor near the Tingira Street DMPA. The Great Barrier Reef International Marine College is located approximately 200 m north of the DMPA.

Adjacent to the DMPA are commercial buildings occupied by Australian Maritime Safety Authority, Maritime Safety Queensland, Queensland Police Service (Water Police) and Queensland Parks and Wildlife Services. While these buildings are not classed as sensitive receptors, the proponent has committed to mitigate any potential air quality impacts.

The DMPA air shed is influenced by adjoining industrial uses such as asphalt plant operations, ship repair facilities, boating emissions and odours associated with the marine environment. An asphalt plant is located within 65 m from the proposed DMPA.

Air pollutants emitted from the asphalt plant mostly include SO<sub>2</sub>, CO, VOCs, NO<sub>x</sub> (refers to nitrogen monoxide (NO) and nitrogen dioxide (NO<sub>2</sub>)) and particulates. Odours are associated with intertidal movements of the mudflat areas of Trinity Inlet.

## Traffic and transport

The EIS notes that supply of stiff clay dredge material would enter the DMPA from sea via Trinity Inlet at Smiths Creek.

Road access to the DMPA is configured to take movement of light commuter vehicles and over-width heavy vehicles associated with the transfer of large vessels. Access would be required to transport plant and daily vehicle movements of staff and service vehicles. Project-related vehicles would utilise Aumuller Street, which is a primary route for commercial, industrial and maritime activities in the Portsmith area.

Aumuller Street has connection to Ray Jones Drive and the Bruce Highway. The EIS documentation indicated that the Bruce Highway is a national highway and is a designated national freight route. Ray Jones Drive is scheduled to be upgraded to six lanes from July 2018.

## 7.3.2 Matters of state environmental significance

### Submissions received

Submissions received on the EIS documentation raised issues about the project's impacts to potential habitat for protected shorebirds at the Tingira Street DMPA. I have considered all submissions on the EIS documentation in my evaluation of the project.

### Impacts and mitigation measures

#### Protected wildlife

Placing dredge material at the Tingira Street DMPA will potentially result in the permanent loss of habitat for the Beach stone-curlew. Submissions on the EIS documentation raised issues about potential impacts to the species' habitat at this location.

While potential habitat for shorebirds at the Tingira Street DMPA would be lost as a result of the project, it is an area of reclaimed land that is a disturbed, artificial environment with little critical habitat values for shorebirds. The EIS documentation reported that other shorebird habitats in Cairns provide more important habitat values than the Tingira Street DMPA, including:

- saltmarshes, saltpans and wetlands at East Trinity
- mudflats along the Cairns esplanade
- intertidal sand flats at the mouth of the Barron River
- Double Island, Haycock Island and the sand and reef flat between them.

To ensure that project impacts to the Beach stone-curlew are adequately managed, I have stated a condition (Appendix 2) requiring the proponent to undertake works at the Tingira Street DMPA outside the species' breeding season (September to February).

## **Marine plants**

### *Tidally-influenced vegetation*

Dredge material is proposed to be placed at the northern placement area at the Tingira Street DMPA, which requires removing 0.76 ha of tidally-influenced vegetation that contains marine plants. Clearing marine plants at this location is covered under a current approval, therefore offsets would not be required for removing tidally-influenced vegetation.

I am satisfied the proponent has provided sufficient information to assess the potential impacts to tidally-influenced vegetation at this location and that the impacts are acceptable.

### *Mangroves*

Mangroves growing on the south and southwestern boundary of the Tingira Street DMPA are within the Trinity Inlet declared FHA. They may be affected by sedimentation and runoff from the site during placement and settlement of the dredge material. The proponent has committed to implement the following measures listed in the DMP to manage runoff impacts on the mangroves:

- installing erosion and sediment controls
- installing a sediment fence around the entire perimeter of the placement areas
- maintaining a 20 m buffer zone between the placement site and the mangroves
- developing and implementing a storm water management plan.

I consider the proposed measures to be appropriate and adequate to manage runoff from impacting the mangroves.

Mangroves at the southern placement area will be cleared (total area of southern placement site is 1.3 ha) for placement of dredge material. The proponent holds a current approval to clear marine plants at this location. Offsets would not be required for clearing mangroves at this location.

I am satisfied the proponent has provided sufficient information to assess the potential impacts to mangroves at this location and that the impacts are acceptable.

#### **Trinity Inlet declared FHA**

Mangroves growing on the south and southwestern boundary of the Tingira Street DMPA are within the Trinity Inlet declared FHA and may be indirectly affected by sedimentation and runoff from the site during placement and settlement of the dredge material. Potential impacts to these mangroves is assessed above in the marine plants section.

#### **Coordinator-General's conclusion: Matters of state environmental significance**

I am satisfied that the proponent has assessed project impacts on MSES from placing dredge material at the Tingira Street DMPA.

I note that placing dredge material at the Tingira Street DMPA would not result in significant residual impacts to MSES. The clearing marine plants at the Tingira Street DMPA is covered under a current approval, therefore offsets would not be required for removing tidally-influenced vegetation.

In order to ensure potential impacts to the Beach stone-curlew are appropriately managed, I have stated a condition (Appendix 2) requiring the proponent to undertake works at the Tingira Street DMPA outside the Beach stone-curlew's breeding season (September to February) to ensure that impacts to the species are adequately managed.

I am satisfied that the potential impacts to MSES as a result of construction activities associated with the onshore placement of dredge material at the Tingira Street DMPA would be managed appropriately through the proposed mitigation measures and stated conditions.

### **7.3.3 Acid sulfate soils**

#### **Submissions received**

Submissions received on the EIS documentation identified the following key issue regarding placement of dredge material at the Tingira Street DMPA:

- The project's DMP did not explain how potential acid sulfate soils (PASS) would be separated from stiff clays to avoid placement of PASS in locations where oxidation is probable

I have considered all submissions and responses provided by the proponent in my evaluation and my assessment is provided below.

#### **Methodology**

The project involves the placement of 100 000 m<sup>3</sup> of stiff clay dredge material that would be placed at the Tingira Street DMPA.



An assessment of dredge material characteristics was undertaken to identify the location, classification and volume of types of material that is to be dredged for the DMPA. The laboratory testing identified that stiff clays to be placed at the DMPA were non-ASS.

### **Impacts and mitigation measures**

There is a potential impact for PASS material to be contained within the stiff clay dredged material. The EIS documentation identified that inadvertent excavation of PASS material through dredging comingled with stiff clay and transported to the DMPA may occur.

Submissions received on the EIS documentation raised issues regarding that there was no explanation in the EIS on how the PASS materials would be separated from the stiff clays.

The EIS indicated that only non-PASS stiff clay dredge material would be placed at the DMPA. The proponent has developed an acid sulfate soil management plan (ASSMP) to control and mitigate such potential impacts for onshore placement of dredged material.

To manage the potential impact of stiff clays containing ASS, the ASSMP outlines in its inspection procedures that placed materials would be regularly tested for possible PASS materials within the stiff clays and verification through laboratory analysis.

The proponent would implement the following management and contingency measures:

- identification, sampling and testing of each stiff clay load
- segregation of PASS material from non-PASS material
- feasibility of segregated material to be removed for disposal at licensed PASS premises
- treatment of placed comingled PASS materials with applicable liming rates
- the conduct of regular auditing of placement activities and ASS management measures.

I am satisfied that these measures outlined in the ASSMP would enable the exclusion and or treatment of PASS materials that may be contained in dredge material placed at the DMPA.

I have stated a condition within the EA requiring the proponent to prepare an ASSMP to ensure that dredge material that may potentially contain ASS is managed effectively and the plan to be in accordance with the guidelines.

### **Coordinator-General's conclusion: Acid sulfate soils**

I am satisfied the assessment of the placement and treatment of the dredged material is adequate. The assessment predicted that there is potential for PASS material to be contained within dredge material. PASS would be managed through the implementation of the ASSMP.

I consider that the stiff clay dredge material that will be placed over previously placed dredged material and general fill represents a beneficial reuse of dredge material that improves the suitability of the area for future port activities.

To ensure the management of potential impacts of stiff clay material containing ASS associated with onshore placement of dredged material at the DMPA, I have stated a condition in the EA for the Tingira Street DMPA requiring the proponent to manage the material in accordance with the guideline.

I am satisfied that the mitigation measures outlined in the ASSMP and stated conditions would ensure that potential impacts resulting from the placement of dredge material at the Tingira Street DMPA can be managed.

### **7.3.4 Noise**

Impacts to noise from onshore placement of dredge material at the Tingira Street DMPA was not a key issue raised in submissions received on the EIS documentation. I acknowledge the potential for noise impacts and have considered them in the assessment below.

#### **Impacts and mitigation measures**

Dredge material would be progressively placed within a bunded area of existing port land on which the Tingira Street DMPA would be established. Works would be occurring 24 hours per day, seven days per week for approximately six weeks.

Noise would be generated through the placement of dredge material within the DMPA via excavators, dump trucks, dozers and graders. The assessment predicts compliance with the noise targets in the NSW Department of Environment and Climate Change 'Interim Construction Noise Guideline' (2009) (ICNG) of 65 dB(A) and 70 dB(A)  $L_{eq}(15min)^{29}$  at the nearest sensitive receptors during standard construction hours. With regards to night-time noise impacts, the assessment noted that the Tingira Street DMPA is within an industrial area and that there are no sensitive receptors that would be exposed to noise during the night-time period.

Mitigation measures including selecting less noisy plant and equipment, limiting the use of reversing alarms, locating/orienting noisy plant away from sensitive receptors and communicating with potentially impacted stakeholders, have been identified to manage any potential impacts.

The proponent has committed to preparing a construction noise and vibration management plan for specific project areas, which would include the mitigation measures outlined above.

### Coordinator-General's conclusion: Noise

I am satisfied with the assessment and the conclusion that noise generated from the placement of dredge material at the Tingira Street DMPA would not generate noise above the relevant ICNG noise targets.

The proponent has committed to preparing a construction noise and vibration management plan for specific project areas which would include the mitigation measures outlined in the EIS documentation. I expect that the proponent implements the mitigation measures outlined within the EIS documentation for each construction activity.

I have stated conditions in Appendix 2 for the EA for the Tingira Street DMPA setting noise limits and requirements for noise monitoring to ensure that noise associated with the placement of dredge material in the Tingira Street DMPA is managed to avoid nuisance to sensitive receptors.

I am satisfied that the stated conditions, proponent commitments, mitigation measures and the construction noise and vibration management plan would ensure that potential noise impacts resulting from construction works at the Tingira Street DMPA can be managed effectively.

### 7.3.5 Air quality

Impacts to air quality from onshore placement of dredge material at the Tingira Street DMPA was not a key issue raised in submissions received on the EIS documentation. I acknowledge the potential for air quality impacts and have considered them in the assessment below.

#### Impacts and mitigation measures

##### Pre-construction and construction impacts

Sources of air pollutants include:

- exhaust emissions from plant equipment
- dust from vehicle movement on unsealed roads
- dust from exposed soil under high wind conditions from DMPA site preparation and restoration of disturbed areas
- odour from dredge material being exposed to air.

The EIS stated the DMPA operations will be undertaken 24 hours per day, seven days per week for approximately six weeks. Site preparation at both sub-placement sites of the DMPA involves clearing and grubbing to remove the existing grass and regrowth vegetation and the formation of bunds (estimated to be <0.5 m high) around the perimeter of the placement areas using clay found onsite.

##### *Air pollutants*

While the stiff clay is being placed in the DMPA, the EIS air quality assessment concluded that unmitigated stiff clay placement activities may result in exceedances of

the EPP (Air) annual air quality objective for PM<sub>2.5</sub> at the Great Barrier Reef International Marine College. The concentrations of all other pollutants are expected to be less than the criteria. The EIS predicted the annual maximum concentration of PM<sub>2.5</sub> would be 8.4 µg/m<sup>3</sup>, which is slightly above the EPP (Air) air quality criteria of 8 µg/m<sup>3</sup>. I note the activities undertaken at DMPA would take 30 days, not a year as modelled and it is unlikely the criteria for PM<sub>2.5</sub> would be exceeded.

To mitigate PM<sub>2.5</sub> impacts, the proponent has committed to ensure that construction dust management measures are adopted as required to minimise dust generation. I support this commitment, included in this report at Appendix 6, and require it to be undertaken by the proponent.

To ensure that sensitive receptors do not experience air quality impacts, I have stated conditions in Appendix 2 that the project must not cause environmental nuisance. Given the duration of activities and the implementation of proposed mitigation measures and proponent commitments, I am satisfied the air quality objectives for PM<sub>2.5</sub> at the Great Barrier Reef International Marine College would be within the air quality criteria.

### *Odour*

The EIS found the stiff clay being dredged and delivered to the DMPA has lower potential for the oxidation of pyrite and release of hydrogen sulphide (H<sub>2</sub>S) than soft clay. Hydrogen sulphide is the gas responsible for the “rotten egg” odour. The odour associated with placement of stiff clay is predicted to have less odour than the mangrove mudflats adjacent to the DMPA in Trinity Inlet. The proponent has committed to monitor and minimise as far as practical, the extent of any soft clays excavated by the backhoe dredger in order to limit the potential for odour impacts from the Tingira Street DMPA. I support this commitment, included in this report at Appendix 6, and require the ongoing monitoring to be undertaken by the proponent.

I am satisfied the proposed mitigation measures and proponent commitments would be adequate to manage the potential air quality impacts on sensitive receptors surrounding the Tingira Street DMPA.

### **Construction mitigation measures**

In addition to the specific mitigation measures listed above, the CEMP will include standard mitigation measures, which include:

- dust and wind will be monitored onsite and work that may generate dust will cease if strong winds occur
- all project personnel will receive training in air quality control practices
- water carts, sprinklers, sprays and dust screens will be used where appropriate to control dust emissions from exposed surfaces and dust generating activities at a frequency appropriate to conditions
- rumble grids and coarse aggregate will be installed at exit roads to prevent soil being deposited into public roads
- manual cleaning of vehicles and roads will be conducted as required

- construction equipment, including dredging vessels, will be properly maintained to ensure exhaust emissions comply with relevant standards
- drop heights from trucks will be less than two metres
- truck loads are to be covered
- any complaints from the public are to trigger investigation by the operator to determine appropriate control measures
- waste will be segregated and collected regularly to control odours.

### **Coordinator-General's conclusion: Air quality**

Based on the results of predicted modelling undertaken in the EIS, I am satisfied that potential air quality impacts resulting from the project's placement activities can be managed.

To ensure that sensitive receptors do not experience air quality impacts, I have stated conditions in Appendix 2 that the project must not cause environmental nuisance.

I am satisfied that the proponent commitments and mitigation measures outlined in the EIS documentation and stated conditions would ensure air quality impacts associated with the onshore placement of dredge material at the Tingira Street DMPA are managed appropriately.

## **7.3.6 Traffic and transport**

Impacts traffic and transport from onshore placement of dredge material at the Tingira Street DMPA was not a key issue raised in submissions received on the EIS documentation. I acknowledge the potential for traffic and transport impacts and have considered them in the assessment below.

### **Methodology**

A traffic assessment undertaken described the potential impacts of construction traffic on the existing road network. This assessment was undertaken in accordance with the then *Guidelines for Assessment of Road Impacts of Development 2006* (GARID). The RDEIS indicates the modelling assessed intersections where project-related volumes are predicted to be 5 per cent or greater than background traffic. The GARID states that, in general, a development's road impacts are considered to be insignificant if the development generates an increase in traffic on the surrounding road network of no more than 5 per cent of background traffic levels.

The assessment considered impacts on the existing road network from traffic associated with the movement of heavy vehicles to and from the DMPA sites. Traffic generated during the pre-construction, construction and decommissioning phases across both DMPA sites were also considered.

### **Impacts and mitigation measures**

The transporting by road of construction plant such as oversized excavators, a bulldozer and grader to and from the DMPA during the pre-construction and

decommissioning phases could temporarily affect the local, state and national road networks.

The plant equipment is proposed to be delivered to the placement areas and would require vehicle access into Tingira Street which is currently configured to take movement of over-width heavy vehicles associated with the transfer of large vessels and machinery equipment.

The EIS documentation estimates that, in total, 18 oversize heavy vehicles trips and two heavy vehicle trips would occur during these two phases at the Tingira Street DMPA over a 12-week period. The EIS concluded that the impact of project-related traffic generated during all phases at the DMPA would not significantly impact on the existing road network traffic volumes and a further assessment under GARID was not triggered.

To manage these heavy vehicle movements to the DMPA and to ensure the project does not result in unacceptable impacts on the local and state-controlled network, the following measures would be implemented:

- the transportation of plant and equipment would occur outside of peak traffic periods
- consultation with DTMR and CRC to provide details of potential escort requirements.

To mitigate potential impacts of the project on the state-controlled and local road network, the proponent has committed to develop and implement a TMP in consultation with DTMR and CRC. Through the TMP, I consider that this would address road use at the DMPA site access areas, potential congestion at intersections, and heavy vehicle haulage movements. I have recommended a condition for the proponent to obtain the necessary permits and approvals under the TI Act.

I am satisfied that appropriate traffic controls would be applied to manage traffic movements and relevant permits from CRC and DTMR would be sought by the proponent for transporting heavy plant and equipment.

### **Coordinator-General's conclusion: Traffic and transport**

I am satisfied that the traffic assessment undertaken for the project is appropriate. I note that the usage of the road network is expected to result in a minor increase in traffic and is unlikely to be an adverse impact to and from the DMPA site.

The EIS identified that safe access to the DMPA site can be adequately provided to allow the transportation of heavy vehicles and daily movements of staff and service vehicles.

I have recommended a condition for the proponent to prepare a heavy vehicle haulage management plan for any excess-mass or over-dimensional loads for all phases of the project and to consult with DTMR, CRC and the Queensland Police Service prior to commencing construction.

In addition, this condition will also require the proponent to confirm haulage vehicle routes, timings and escort requirements on the local and state road networks through the preparation of a TMP.



I have also recommended a condition requiring the proponent to submit transport-related permits and a TMP to DTMR and CRC for any works including vehicular access within state-controlled and local roads to facilitate safe access, egress of heavy vehicles under state-controlled road corridors.

I am satisfied that a TMP, a heavy vehicle haulage management plan and recommended conditions would ensure the potential issues at the Tingira Street DMPA regarding the facilitation of safe access and egress of heavy vehicles are appropriately managed.

## **8. Land use and planning**

The EIS documentation detailed the existing environment and identified potential land use impacts resulting from the construction and operation of the project.

### **8.1 Existing environment**

#### **8.1.1 Land use**

The Port of Cairns is situated on the western bank of Trinity Inlet, a mangrove-lined estuary to the east of Cairns. The Port borders the Cairns CBD and is surrounded by a mix of commercial and industrial uses. Residential apartments and short-term accommodation are located close to the Cairns Cruise Liner Terminal (CCLT).

Swing basins within the inner harbour channel are currently used by cruise ships, cargo ships and vessels berthing at the Cairns Naval Base (HMAS Cairns).

The proposed land-based placement of dredge material includes the Northern Sands Dredge Management Placement Area (DMPA) and Tingira Street DMPA. The Northern Sands DMPA currently operates as a sand quarry and landscape supply and waste reduction and disposal facility. This DMPA is licensed to receive inert waste. The Tingira Street DMPA consist of two parcels of land which have been formed by reclamation filling and are currently unoccupied.

#### **8.1.2 Native title**

There is one native title determination in the Trinity Inlet area for the Mandingalbay Yidinji People. Dredging for future channel widening and new swing basin will be outside of this determination area.

The Gimuy Walubara Yidinji People have made a native title claim for part of the Trinity Inlet and the western landside area of Trinity. Because the project would impact this area, the proponent is required to prepare a cultural heritage management plan (CHMP), in consultation with the Gimuy Walubara Yidinji People for works proposed within their native title claim area.

The Yirrganydji people have a registered native title claim over parts of Cairns, including Trinity Inlet. The claim area includes the Northern Sands DMPA, the wharf,

Tingira Street DMPA and part of the shipping channel. The proponent is required to develop a CHMP with the Yirrganydji people prior to commencing construction.

### 8.1.3 Tenure

The existing and proposed shipping channel and swing basins are situated on Crown Land. Ports North, a Queensland Government-owned corporation, operates the Port of Cairns and has vested planning powers under the *Transport Infrastructure Act 1994* (TI Act) for an area identified as Strategic Port Land (SPL) which stretches from Portsmouth to Cairns North, including land at East Trinity and extending into tidal waters.

The landside project works will be located over four freehold titles and two perpetual lease properties, as detailed in Table 8.1 and shown in Figure 8.1. All freehold lots and one of the two leases are under Ports North control.

**Table 8.1 Tenure of properties to be affected by the construction of the project**  
(Source: RDEIS Chapter B1)

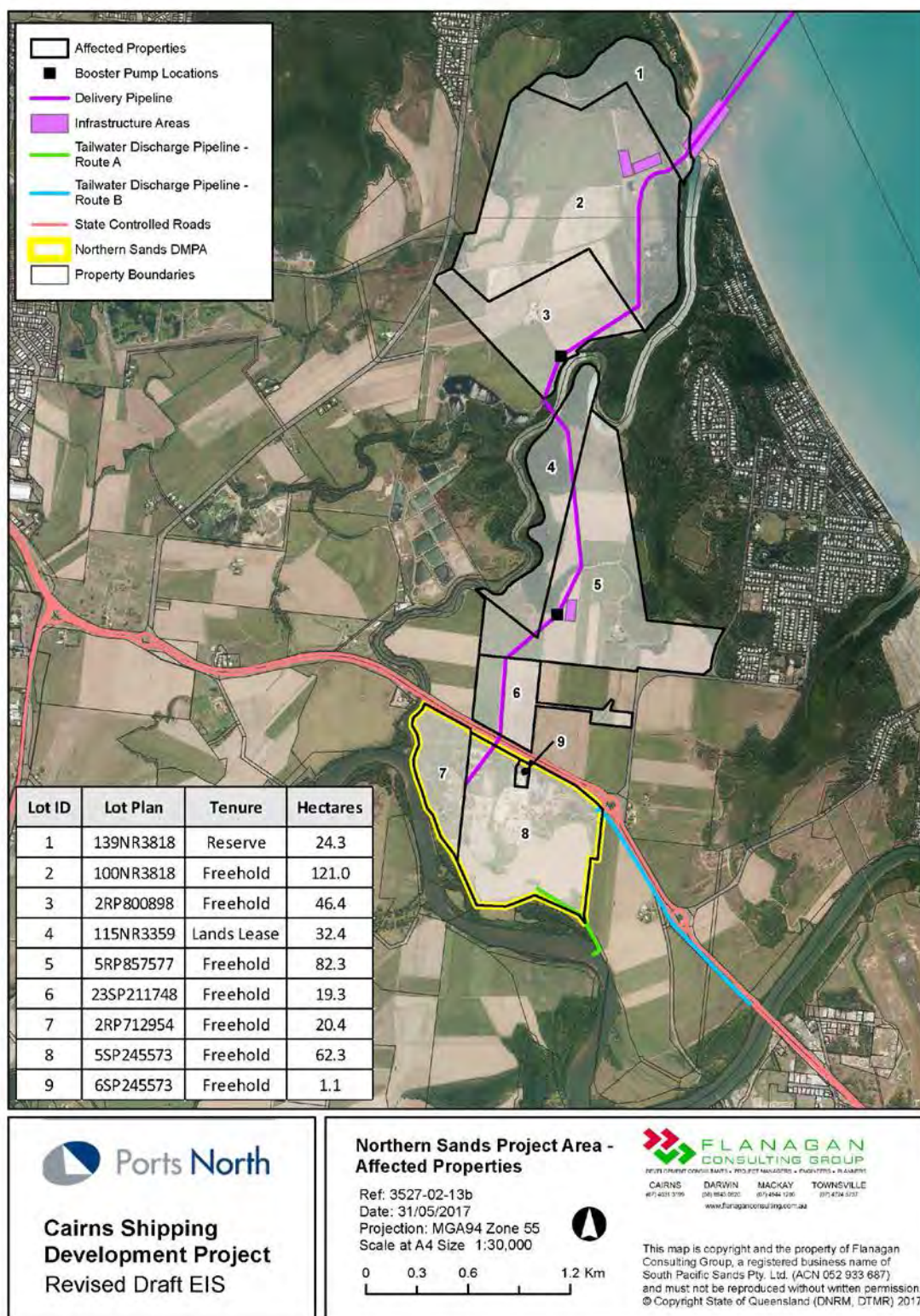
Lot plan	Tenure
<b>Landside Project Works</b>	
345SP113643	Freehold
1SP113642	Freehold
9SP113632	Freehold
10SP214821	Freehold
509NR5788	Lease in perpetuity
15SP214821	Lease in perpetuity
<b>Northern Sands DMPA</b>	
2RP712954	Freehold
5SP245573	Freehold
6SP245573	Freehold
<b>Delivery Pipeline Corridor</b>	
139NR3818	Reserve
100NR3818	Freehold
2RP800898	Freehold
115NR3359	Lands lease
5RP857577	Freehold
23SP211748	Freehold

The Northern Sands DMPA comprises three freehold titles totalling approximately 84 ha, accessed by the Captain Cook Highway, as detailed in Table 8.1 and shown on Figure 8.1. The delivery pipeline will cross six lots as well as the Captain Cook Highway and a Cairns Regional Council (CRC) esplanade. The tenure of the lots affected by the DMPA and the delivery pipeline comprise freehold land, reserves and State leased land including Richters Creek and the Captain Cook Highway. Two

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protected areas exist within the Northern Sands Project Area comprising the Great Barrier Reef Coast Marine Park and the Yorkeys Creek declared fish habitat area (Yorkeys Creek FHA discussed further in Section 6.3).

The Tingira Street DMPA site contains one freehold title totalling approximately 27 ha, as detailed in Table 1.1 and shown on Figure 2.5.



**Figure 8.1 Northern Sands Project Area – Affected properties**

## 8.2 Queensland planning framework

The project and its components are located in areas under the jurisdiction of the Commonwealth Government, the Queensland Government, the CRC and Ports North. Approvals for various components of the project are required under the legislation relevant to each jurisdiction.

### 8.2.1 Far North Queensland Regional Plan 2009 – 31 (FNQRP)

The FNQRP provides a strategic planning framework for the Far North Queensland Region and recognises the Port of Cairns as regionally significant transport infrastructure. Land under the control of Ports North is excluded from the provisions of the Cairns Plan 2016, therefore application of the FNQRP as it relates to development on SPL is limited.

Notwithstanding, the FNQRP does have a number of provisions which support protection of the Port's operation and its ongoing compatibility with the adjoining CBD including:

- sea ports are protected from encroachment of noise-sensitive land uses except where permitted in land use plans for SPL
- adequate SPL is made available at Cairns for coastal uses, such as commercial fishing and other land-based marine activities
- facilitating the development of sustainable cruise shipping infrastructure and services.

I consider the works proposed for the project to be generally consistent with the FNQRP.

### 8.2.2 Planning Act 2016

Following the release of my report, the proponent would be required to obtain key approvals under the *Planning Act 2016* as listed in Section 4, Table 4.1.

The project will necessitate numerous downstream approvals for various aspects of development including the offshore dredging and land-based disposal of dredge material at the Northern Sands DMPA. The assessment manager for these works will vary depending on the location, tenure and nature of the proposed development and could be either CRC, Ports North, DES and/or DSDMIP/SARA.

Section 48(6) of the Planning Act 2016 allows for the Planning Minister to make a determination of the assessment manager and referral agencies for all or some of the subsequent approvals to ensure appropriate coordination of the approvals process and approval conditions.

### 8.2.3 Ports North (Cairns Port Authority) Land Use Plan

The Ports North (Cairns Port Authority) Land Use Plan (LUP) controls land use and development on SPL and sets out the main Local Area Plans that are applicable to the project which include the Seaport Local Area Plan (LAP) and the Cityport LAP. The



Seaport LAP recognises that expansion of the Port is required to meet the demand for passenger-related facilities.

The Landside Works and Tingira Street Project Areas are located within the Ports North confines on SPL, within the Seaport LAP and the Waterfront Industry Planning Area. Under the TI Act, SPL is not subject to a local government planning scheme. As such, the Ports North LUP is the key planning document for the Cairns SPL parts of the study area.

Land-based infrastructure required to service proposed cruise ship operations located within the LUP, may trigger the requirement for approval by Ports North.

I consider the works proposed to be undertaken on SPL to be generally consistent with the Ports North Land Use Plan.

### 8.2.4 CairnsPlan 2016

The project is located within the City of Cairns LGA. Development within the Cairns LGA, with the exception of land identified as SPL pursuant to the TI Act, is described by the CairnsPlan 2016 which sets out the Council's intentions for future development in the planning scheme area over the next 20 years.

The placement of soft clay at the Northern Sands DMPA and the construction and operation of the associated pipelines and bunds triggers assessable development under the CairnsPlan 2016. Specifically, land placement of dredge material at the Northern Sands DMPA triggers the requirement for a material change of use (MCU) approval. The CairnsPlan 2016 does not contain a use definition that adequately describes the onshore placement of dredge material, therefore the use would be considered an 'undefined use' for assessment purposes.

I have stated conditions for a development permit for an MCU for the land placement of dredge material at the Northern Sands DMPA to ensure the use does not adversely impact the environment or adjacent land uses. I have also stated a condition that dredge material placement at the Northern Sands DMPA must not commence until those activities currently using Lake Narelle have ceased. Uses may recommence once the dredge material placement, tailwater discharge and PASS treatment project activities have been completed.

The onshore placement of dredge material and release of dredge tailwater from the Northern Sands DMPA would also trigger a requirement for an MCU approval for an Environmentally Relevant Activity – dredging (ERA16(1)1(d)) under the *Environmental Protection Act 1994* (discussed further in Section 5.4 State Development Assessment Provisions below).

The construction of the dredge material delivery pipeline triggers the requirement for an operational works approval under the CairnsPlan 2016. I am satisfied that the proposed delivery pipeline corridor identified in the EIS documentation is an appropriate location for the activity and I have stated conditions for a preliminary approval for operational works for this aspect of development. The proponent would be required to provide further detailed information about the pipeline location and siting as part of obtaining a



subsequent development permit for operational works. The proponent is committed to conducting community engagement to inform the public of the pipeline works including information about how the area would be fully restored.

I consider the works proposed to be undertaken in the Northern Sands DMPA, including the construction and operation of the associated pipelines, to be generally consistent with the CairnsPlan 2016.

### **8.2.5 State Planning Policy (SPP)**

The SPP defines the Queensland Government's policies about matters of state interest in land use planning and development. The state interest for Strategic Ports requires the protection of the operation of strategic ports and enables their growth and development. The SPP's focus is upon ensuring a planning scheme integrates this state interest and the CairnsPlan is considered to have integrated the principles of the SPP as they relate to the Cairns Port with land uses and access well-developed at the project interface. The Landside Works and Tingira Street Project Areas are considered to generally meet the outcomes sought by the SPP, particularly as they relate to promoting economic growth.

The SPP also applies to the use of the Northern Sands as a DMPA; the placement of dredge material at the Northern Sands DMPA is also considered to meet the outcomes sought by the SPP.

### **8.2.6 State Development Assessment Provisions**

The State Development Assessment Provisions (SDAP) provide for specific matters of state interest and further detail the code assessment criteria for assessable development and referral requirements.

The SDAP assessment criteria are contained in standalone state codes which are broadly grouped into locational, use-based or advice only. The SDAP is a statutory document and is prescribed in the Planning Regulation.

The State codes relevant to the project include:

- State code 1 – Development in a state-controlled road environment
- State code 6 – Protection of state transport networks
- State code 7 – Maritime safety
- State code 8 – Coastal development and tidal works
- State code 11 – Removal, destruction or damage of marine plants
- State code 12 – Development in a declared fish habitat area
- State code 14 – Queensland heritage
- State code 16 – Native vegetation clearing
- State code 18 – Constructing or raising waterway barrier works in fish habitats
- State code 22 – Environmentally relevant activities.

For a detailed assessment of matters relating to the SDAP codes listed above, refer to Section 6 (Capital dredging and port upgrades), Section 7 (Delivery of dredge material) and Section 8 (Onshore placement of dredge material) of this report.

### **Development in a state-controlled road environment**

State code 1 of the SDAP seeks to protect state-controlled roads from adverse impacts of development. The code also seeks to protect the safety of people using, and living near state-controlled roads.

The EIS identified that the state-controlled road network would not be significantly impacted by the haulage of pipelines associated with the pre-construction and decommissioning phases of the project. However, it did identify that the Northern Sands DMPA could impact the adjoining Captain Cook Highway due to a potential increase in overland flow coming off the site.

To ensure any potential impacts on the network are adequately managed, I have recommended a condition requiring the proponent to prepare and submit a traffic management plan to DTMR for works within state-controlled roads including the laying of dredge material pipeline crossings under state-controlled road corridors.

I have stated a condition requiring that flooding from the project be managed to ensure no worsening to the Captain Cook Highway, see Section 7 for further detail.

I am satisfied that the project is generally consistent with the overarching objectives of State code 1.

### **Protection of state transport networks**

State code 6 seeks to protect state transport infrastructure, public transport infrastructure and public passenger services from the adverse impacts of development. The code also seeks to maintain the operational performance of the transport network and ensure that development enables safe and convenient access to public passenger transport.

The project is not anticipated to adversely impact any state transport infrastructure, public transport infrastructure or public passenger services.

To ensure the project does not compromise the future public passenger transport corridor (Cairns Transit Network), I have recommended a condition requiring that a 50 m setback be retained from the future public passenger transport corridor. This requirement is consistent with conditions previously imposed on approvals for existing land uses on the Northern Sands site.

I am satisfied that the project is generally consistent with the overarching objectives of State code 6.

### **Maritime safety**

State code 7 of the SDAP seeks to ensure development supports the safe operation of vessels in navigable waterways.

The EIS documentation predicts that an increase in construction vessel traffic generated during the pre-construction, construction and decommissioning phases of the project would have the potential to impact vessel safety and obstruct the navigation of other vessels, including commercial shipping boats and navy vessels. The potential marine traffic and navigational safety issues associated with vessel operations and maritime works during the construction phases of the project were assessed. It is proposed that the concurrent movement of shipping and dredge vessel operations be managed in communication with vessel owners and Maritime Safety Queensland (MSQ) to ensure optimum use of the shipping channel and inner port.

I have stated a condition for the operational works approval for tidal works requiring the proponent to develop and implement a vessel traffic management plan with the relevant Regional Harbour Master to ensure vessel traffic impacts are adequately managed. I am satisfied that the project is generally consistent with the overarching objectives of State code 7.

### **Coastal development and tidal works**

State code 8 of the SDAP seeks to maintain and conserve coastal processes and avoid impacts to matters of state environmental significance.

Capital dredging and the upgrade of port infrastructure could impact on marine water quality within Trinity Inlet and Trinity Bay. The EIS states that water quality impacts could occur primarily from turbid plumes releasing sediment particles into the water body during the dredging campaign, which could affect seagrass. The proponent has committed to implement a Dredge Management Plan to reduce the extent and magnitude of turbid plumes in order to minimise impacts to marine flora and fauna.

As part of the Dredge Management Plan, a Reactive Monitoring Program would be prepared and implemented during the dredging campaign to monitor water quality at locations of sensitive receptors.

I am satisfied that the EIS has adequately assessed potential impacts of the project on marine water quality, marine sediment quality and coastal processes. The proponent's draft Dredge Management Plan, to be finalised by the dredge contractor, is subject to approval by DES. I have stated conditions for an EA for capital dredging and a material change of use approval for ERA16 under the *Planning Act 2016* to ensure protection of environmental values in the vicinity of the dredging activities. I am satisfied that the project is generally consistent with the overarching objectives of State code 8.

### **Removal, destruction or damage of marine plants**

State code 11 seeks to maintain both marine plant communities and the health and productivity of fisheries resources and fish habitat.

The proposed expanded shipping channel overlaps with areas that previously supported seagrass. The proponent has committed to conduct seagrass surveys before dredging to confirm presence of seagrass and the area of direct impact, if any. Capital dredging will also remove approximately 34.5 ha of seabed which may contain benthic community values.

At least 0.42 ha of marine plants offshore from Yorkeys Knob and associated with Richters Creek may be disturbed during construction of the pump-out facility and the dredge delivery pipeline. The proponent has committed to refine the pipeline alignment during detailed design to avoid impacts to marine plants as far as practicable.

Placing dredge material at the Tingira Street DMPA would result in a loss of marine plants. However, the proponent holds existing permits to disturb marine plants in this area.

Mangroves, which are marine plants, growing along the south and south-western boundary of the Tingira Street DMPA may be damaged by runoff from the site. The proponent has proposed measures to mitigate runoff impacts including installing erosion and sediment controls and maintaining a 20 m buffer zone between the placement site and the mangroves.

The proponent is committed to minimising impacts to marine plants, as far as possible. If any significant residual impacts are identified the proponent would be required to provide offsets in accordance with the *Environmental Offsets Act 2014*. Offset requirements will be determined when the proponent applies for the marine plants clearing permit. I am satisfied that the project is generally consistent with the overarching objectives of State code 11.

### **Development in a declared fish habitat area**

State code 12 seeks to ensure any development in a declared fish habitat area (FHA) is limited and that impacts on marine plants, waterways and declared fish habitat areas of state environmental significance are avoided.

The Trinity Inlet FHA was declared in 1998 with an exclusion area to cater for future expansions of the shipping channel. The proponent proposes to adjust the current exclusion zone slightly west and convert sections of the current exclusion zone to declared FHA which will require a legislative change under the Fisheries Regulation 2008. I note that DES (previously DNPSR) has confirmed they generally support the proposed amendment.

The project does not propose any development within the Trinity Inlet declared FHA. However, the mangroves growing on the south and southwestern boundary of the Tingira Street DMPA are within the management B area of the Trinity Inlet declared FHA. Management B areas provide a buffer, enhancing protection for key fish habitats in management A areas. As discussed previously, the proponent has proposed measures to avoid impacts to mangroves from placing dredge material at the Tingira Street DMPA.

The dredge delivery pipeline is proposed to cross the Yorkeys Creek declared FHA, which is entirely a management B area. The pipeline is only a temporary structure proposed to be in place between three to six months. The pipeline will not prevent tidal flow and will be removed in its entirety once placement of dredge material at the Northern Sands DMPA is completed.

I am satisfied that the proponent has provided sufficient information to assess the potential changes to the Trinity Inlet declared FHA and I am satisfied that the project is consistent with the performance outcomes of State code 12.

### Queensland heritage

State code 14 seeks to regulate development on and adjoining a state heritage place to protect and conserve their cultural heritage significance for the benefit of the community.

The Cairns Wharf Complex is listed as a state heritage place (ID: 601790) for aesthetic, scientific, historic and social values.

Ports North owns the Cairns Wharf Complex and has undertaken maintenance and repairs to the reinforced concrete wharves, and renovated and adapted some of the sheds to enhance the cruise terminal facilities.

Wharves 1 to 5 and their associated sheds were originally constructed from 1910-1929. A new building was constructed in 1984 as a cruise liner terminal, opening the wharf to cruise ships.

Wharf 6 was constructed during WWII and demonstrates the importance of Cairns as a centre for Pacific forces. Its timber and reinforced concrete construction reflect war-time expediency. It is in poor condition from weather exposure and borer infestation. The structural assessment in the EIS found that wharf 6 does not comply with current Australian standards for the design of maritime structures (AS 4997–2005) and is not fit for purpose.

The proponent proposes to install berthing and mooring dolphins at wharves 1 to 5 and partially demolish wharf 6.

### Wharves 1 to 5

Mooring dolphins will be installed up to 50–80 m beyond the ends of wharf 1 and wharf 5 and will be accessible via lightweight aluminium walkways attached to lightweight piles. The mooring dolphins are unlikely to have a physical impact on the fabric of the wharf structures.

New berthing dolphins will be installed at wharves 1 to 5, which requires sections of the wharf deck to be cut and removed. The tops of the berthing dolphins will be integrated into the concrete deck via flexible joints, minimising visual impact. Installing the berthing dolphins are likely to change the fabric of the wharves, potentially adversely affecting their originality and historic integrity.

The proponent evaluated several wharf upgrade options and settled on installing mooring dolphins within the existing wharf structure. It was chosen as the most appropriate option to allow the conservation and use of the wharves.

Vibration impacts from installing dolphin piles may affect the wharf structures. Vibration impacts are proposed to be mitigated by ensuring that vibrations do not exceed the maximum vibration standard for heritage structures (3mm/s). Vibration will be monitored during piling. I consider the proposed measures to manage potential impacts

to Wharves 1 to 5 appropriate and acceptable and I am satisfied that the proposal for Wharves 1 to 5 are consistent with the performance outcomes of State code 14.

## **Wharf 6**

The proponent proposes to demolish the deck and seaside piles of Wharf 6 and retain and expose the timber substructure along the foreshore. While partially demolishing Wharf 6 will lose some physical evidence of its cultural heritage significance, exposing and interpreting the timber substructure along the foreshore, as proposed, would enhance the public's opportunity to understand and appreciate Cairns' historical role as a centre for Pacific forces during World War II.

The EIS investigated several options for Wharf 6 and concluded that partial demolition served the optimum balance between retaining the wharf's cultural heritage significance while enhancing its capacity to accommodate larger cruise ships. The proponent has committed to complete archival recording of wharves before commencing upgrades and demolition.

A development application for works on the state heritage place is required. The application requires a detailed description of the proposed development, a heritage impact statement and additional information addressing specific technical issues and relevant mitigation measures in a conservation management plan. I consider the proposed measures to manage potential impacts to the Cairns Wharf Complex appropriate and acceptable and I am satisfied that the proposal for the Cairns Wharf Complex is consistent with the performance outcomes of State code 14.

## **Native vegetation clearing**

State code 16 seeks to ensure that development avoids clearing native vegetation, and where clearing cannot be reasonably avoided it should be minimised to conserve vegetation, avoid land degradation and the loss of biodiversity and maintain ecological processes.

Native vegetation would be cleared along Richters Creek to construct the dredge delivery pipeline. The proponent has committed to refine the pipeline alignment during detailed design to avoid clearing vegetation as far as practicable.

The project would be exempt from requiring a permit for clearing regulated vegetation under the *Planning Act 2016*. This exemption would be confirmed by DNRME as part of subsequent approvals. I am satisfied that the project is consistent with the performance outcomes of State code 16.

## **Constructing or raising waterway barrier works in fish habitats**

State code 18 seeks to ensure that development involving the constructing or raising of waterway barrier works in a fish habitat maintains fish movement and connectivity throughout waterways as well as maintaining the health and productivity of fisheries resources and fish habitat.

The EIS indicates that the pipeline will cross Richters Creek twice. The first crossing is proposed at the mouth of Richters Creek and the second crossing would be upstream



approximately 3 km north of the Northern Sands site. The pipeline would be submerged and laid on the creek bed allowing fish passage. The pipeline would be in place temporarily for three to six months. I consider the potential impacts to fish habitats from constructing the pipeline to be temporary and minor in nature. A detailed assessment of the project's impact to fish habitat area is provided in Section 7.

An operational works application for constructing or raising waterway barrier works in fish habitats is required to comply with the relevant performance outcomes of State code 18. I have stated conditions for an operational works approval to undertake works within a FHA and consider that the project is consistent with the performance outcomes of State code 18.

### **Environmentally relevant activities**

State code 22 of the SDAP ensures that ERAs are located and designed to avoid or mitigate environmental harm. The code also aims to minimise and mitigate impacts to MSES and provide an offset for significant residual impacts where appropriate.

Without mitigation, capital dredging and the upgrade of port infrastructure has the potential to impact on marine water quality within Trinity Inlet and Trinity Bay due to the release of sediment particles in the water body which could affect seagrass. Refer Section 6.4 for further information about the project's potential impacts to MSES.

The EIS states that impacts can be mitigated through the implementation of a Dredge Management Plan and a Reactive Monitoring Program which would be implemented during the dredging campaign to monitor water quality at locations of sensitive receptors.

I consider that potential impacts to the marine and coastal environment are low-risk due to the temporary nature of dredging and construction activities and that they can be managed effectively. To ensure impacts are adequately managed, I have stated conditions for the EA for ERA16 – dredging of more than 1 000 000 m<sup>3</sup> in a year as well as a development permit for a material change of use for the ERA.

As a result, I consider that the project is consistent with the performance outcomes of State code 22.

## **8.3 Coordinator-General's conclusion: Land use and planning**

The EIS identified the potential land use impacts associated with the project. I am satisfied that the project will facilitate the development of sustainable cruise shipping infrastructure and will maintain its compatibility with the adjoining Cairns CBD.

I have assessed the relevant SDAP codes and have stated conditions for the relevant planning approvals to ensure that the state's interest in development assessment are maintained and protected. In accordance with section 39 of the SDPWO Act, I have stated conditions for an operational works approval to undertake works within an FHA to facilitate the placement of the delivery pipeline in Richters Creek. I have stated conditions for an EA for ERA16 – dredging of more than 1 000 000 m<sup>3</sup> in a year as well

as a development permit for an MCU for the ERA. I have stated conditions for a development permit for an MCU for the land placement of dredge material at the Northern Sands DMPA and I have stated conditions for a preliminary approval for operational works for the delivery pipeline corridor.

I also expect that any potential land use impacts would be further reduced through planning and project refinements during detailed design and implementation of the proponent commitments and mitigation measures proposed in the EIS

## **9. Social impacts**

### **9.1 Overview**

A social impact assessment (SIA) was undertaken for the project in accordance with the requirements of the TOR. Specifically, the proponent was required to:

- define the social and cultural area of influence of the project
- incorporate relevant community engagement requirements
- present a social baseline study
- develop a workforce profile
- identify potential social impacts and mitigation measures
- propose management strategies.

The SIA considered potential social impacts in the context of the following areas of influence:

- EIS study area: the Cairns Regional Council (CRC) local government area (LGA), and where demographic information was not available for the CRC LGA alone, the combined CRC LGA and Douglas Shire Council LGA
- project area: the overall footprint of the project including the shipping channel, dredge material placement areas (DMPAs) and wharf upgrades
- Northern Sands DMPA study area: this incorporated the suburbs of Yorkeys Knob, Holloways Beach, Machans Beach, Kamerunga and Caravonica
- Tingira Street DMPA study area: this incorporated the Portsmouth industrial area and the Wharf Street area.

### **9.2 Submissions received**

Submissions received on the EIS documents identified the following key issues relating to social matters:

- perceptions of insufficient or biased stakeholder engagement processes
- potential impacts to water quality during dredging, and consequent impacts to the livelihoods of personnel in the tourism, fishing and aquaculture sectors

- potential impacts to local amenity values including accessibility, environmental quality and recreational amenity as a result of onshore works
- potential impacts to community health and safety from air and noise emissions, improper management of contaminated marine sediments, increased transmission of infectious diseases, increased exposure to road safety risks, and increased flooding hazards.

I have considered all submissions on the EIS documents in my evaluation of the project.

## 9.3 Community and stakeholder engagement

### 9.3.1 Engagement for the EIS

Community and stakeholder engagement in support of the draft EIS was carried out between October 2012 and September 2014, and included:

- 60 meetings, briefings and workshops with stakeholders, including federal, state and local government agencies, representatives from potentially impacted industries (e.g. fishing, tourism), Indigenous organisations, non-governmental organisations (NGOs), and Ports North advisory groups and committees
- a staffed project display at the Cairns Show, for the distribution of fact sheets and interviews with 250 attendees
- independent phone survey of 300 people within the CRC LGA
- dissemination of project updates via a dedicated website and media announcements
- a dedicated project contact number and email address to receive and respond to enquiries and requests for information.

Additional community and stakeholder engagement was undertaken between March 2016 and May 2017 in support of the revised draft EIS, and included:

- 43 meetings and briefings with stakeholders, including potentially impacted landowners, federal, state and local government agencies (including Holloways Beach Environmental Education Centre (HBEEC)), Indigenous organisations, tourism industry representatives, NGOs and Ports North advisory groups and committees
- release of factsheets via the Ports North website, and project updates in media announcements
- continuation of the dedicated project contact number and email address to receive and respond to enquiries and requests for information.

I consider the engagement which the proponent has undertaken to date to be adequate for the purposes of supporting the EIS process. However, based on a review of submissions received, I acknowledge that concern regarding the proposed project remains amongst various groups, including some potentially affected stakeholders within the local community and other special interest groups.

### 9.3.2 Post-EIS engagement

The proponent has committed to providing timely notification to directly impacted stakeholders regarding forthcoming project activities, particularly those which may impede access to or utilisation of public or private land (for example due to establishment of the dredge pipeline and pumping stations).

The proponent has received in-principle approval from landowners whose properties may be impacted by the temporary dredge delivery pipeline. Further consultation and negotiation will be required in order to obtain agreement on matters such as final pipeline route and compensation. The proponent has also committed to consulting with the HBEEC to develop strategies to reduce potential impacts to HBEEC operations during peak usage times.

The proponent has committed to receiving feedback on mitigation strategies through engagement with existing advisory groups and committees, including Ports North's technical advisory consultation committee, ports advisory group and local marine advisory committee (the latter is chaired by GBRMPA). The proponent has also committed to establishing an expert advisory panel, a project management committee, and a regulatory oversight committee to support the delivery of the project.

The proponent has committed to reviewing their existing community complaints management process to ensure that complaints received are appropriately investigated and, if necessary, actioned.

I support the stakeholder and community engagement commitments, and to ensure that the proponent's engagement activities are effective and responsive to stakeholder concerns, I have imposed a condition requiring the proponent to prepare a community and stakeholder engagement plan (CSEP) for my review and approval at least three months prior to the commencement of construction. The CSEP will provide a practical framework for the delivery of ongoing engagement activities, including engagement with the project specific advisory panels and committees which the proponent has committed to establishing. I have required that the CSEP be made publicly available via the project website, and that it be reviewed and, if necessary, updated within six months of the commencement of construction. Prior the project becoming operational, I have required that the proponent update its operational stakeholder management plans.

I have also required that feedback received through implementation of the CSEP inform updates of the proponent's impact mitigation and management strategies for the project. This includes strategies in the construction environmental management plan (CEMP), dredge management plan (DMP), maritime operations management plan (MOMP), vessel transport management plan (VTMP), and any other relevant management plans prepared for the project.

## 9.4 Workforce management

### 9.4.1 Construction

The EIS documents have estimated that a peak workforce of approximately 195 personnel will be required during construction. The proponent will employ locally-based personnel where possible, however a small proportion of highly specialised workers may be sourced from outside the region. The proponent does not intend to utilise any rostered fly-in, fly-out arrangements. The EIS documents report that the local workforce will have sufficient capacity to meet the needs of the project due to the relatively small size of the workforce and the well-established nature of the local marine services industry. Given these factors, I consider it unlikely that the project will cause a significant local workforce shortage during construction.

The proponent has committed to work with the chosen construction contractor to develop appropriate training and recruitment programs. Where possible, these programs will target Indigenous participants, women, secondary school students, and unemployed/underemployed persons. I support this commitment and require the proponent to implement it.

### 9.4.2 Operations

The EIS documents have estimated that up to 1535 direct jobs and 1200 indirect jobs will be supported during operation. As noted in Section 10 (Economics) of my report, I consider that this may be an upper range estimate due to the approach and assumptions used in the economic modelling methodology. Apart from a single part-time (0.2 full-time equivalent) employee, these personnel are not expected to be employees of the proponent, but will primarily be engaged in industries which provide services to the passengers and crew of the cruise vessels, particularly the tourism and hospitality sector.

The EIS documents forecast that operational employment demand will increase gradually over a period of approximately 15 years. I am satisfied that this will provide sufficient time for the local market to adapt to any changes in demand without resulting in significant skills shortages. The EIS documents also note that the peak tourist season in Cairns is typically during the period of April to October, whereas the forecasted period for peak cruise ship arrivals is during the period of October to May. As such, the project may provide opportunities for off-peak season employment for personnel in the tourism and hospitality sector.

The proponent has committed to working with local training organisations during operations in order to increase the skills base of the local population in order to meet the forecast increased employment demand generated by the project. I support this commitment and require the proponent to implement it.

## 9.5 Housing and accommodation

### 9.5.1 Construction

Given the relatively small size of the construction workforce, and the proponent's commitment to recruit the majority of the workforce from the local area, the potential impacts to housing affordability and availability during construction are not expected to be significant.

For instances where accommodation may be required for non-local personnel, the proponent will utilise established local facilities such as hotels and motels. The EIS documents have estimated that the Cairns LGA has a base capacity of more than 5250 rooms to service the existing tourism market, and that this would provide sufficient capacity to cater for any temporary project related accommodation needs. The EIS documents have not considered trends in the use of these facilities, however given the low number of personnel that would require accommodation, I am satisfied that use of these facilities would be unlikely to result in a shortage of accommodation for other users.

### 9.5.2 Operations

Operations phase impacts on housing affordability and availability would typically be caused by a rapid influx of new personnel to meet increased employment demand. However, in this instance I consider that the local workforce will have sufficient capacity to cater for most of the project supported demand.

The majority of the forecast job opportunities will be in the tourism and hospitality sector, and there is already a large pool of local residents (10,550 persons in 2016, comprising 15.8 per cent of the local workforce<sup>30</sup>) with suitable skills and experience. The tourism and hospitality sector also provides opportunities for local unemployed and underemployed residents as barriers to entry are generally low (49.5 per cent of tourism and hospitality employees in Cairns have no formal qualifications).

The peak season for cruise ship arrivals coincides with the off-peak season for general tourism in Cairns, and a large proportion of the tourism and hospitality workforce (approximately 38 per cent) is engaged in part-time work arrangements. This is likely to indicate latent capacity to service increased employment demand.

The EIS documents also estimate that the jobs which are supported by the project will increase gradually over a 15-year period, which would provide time for the housing market to adapt to any changes in demand. Taking these matters into account, I consider it unlikely that the project will have a significant impact on housing availability and affordability during the operations phase.

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<sup>30</sup> Summary statistics for Cairns are based on Australian Bureau of Statistics (ABS) data presented by IDCommunity, available at <http://economy.id.com.au/cairns>



## 9.6 Local business and industry content

### 9.6.1 Construction

The project will provide opportunities for local industries during construction, for example in the supply of contractor personnel, construction materials and machinery/equipment.

The proponent has committed to collaborating with project contractors to foster local employment and supply opportunities during construction, however a clear strategy for local industry participation has not been provided. As such, I require the proponent's CSEP to outline the manner in which the proponent will engage with industry to ensure that local businesses and job seekers are provided with timely notification of potential project opportunities, and are aware of the relevant registration and application processes.

### 9.6.2 Operations

Once the project becomes operational, there will be extensive opportunities for local tourism and hospitality businesses to benefit from increased shore visits by both passengers and crew. I note that the majority of the operation phase opportunities will be driven by market demand, and will not be within the proponent's operational control.

Further detail regarding potential economic risks and opportunities associated with the project is provided in Section 10 (Economics) of my report.

## 9.7 Health and community wellbeing

### 9.7.1 Construction

The EIS documents have identified a range of issues which may potentially impact the health and wellbeing of the local community during the construction of the project. If not appropriately managed, these may include:

- air and noise emissions from project equipment and machinery including booster pumps, road vehicles, marine vessels and earthmoving machinery
- increased traffic volume on local roads, potentially resulting in increased road congestion, and increased road safety risks
- reduced amenity values and restriction of recreational activities such as fishing, diving and swimming in the vicinity of dredging operations
- access restrictions and visual impacts resulting from the placement of the onshore dredge pipeline and pumping stations
- water quality degradation and access restrictions during dredging, and consequent livelihood impacts to personnel in the tourism, commercial fishing, and aquaculture sectors

- community health and safety risks associated with the placement of potentially contaminated dredge material within the Northern Sands DMPA, changes to flood risk for the Barron River, and the use and storage of hazardous substances.

Further detail on these issues, including a review of impact mitigation measures and proponent commitments, is provided in the following sections of my report:

- Section 5 – issues associated with capital dredging and the port upgrade
- Section 6 – issues associated with the dredge material delivery
- Section 7 – issues associated with the onshore placement of dredge material.

Key proponent commitments which have been detailed in these sections, and which will also assist in mitigating potential impacts to health and community wellbeing, include:

- development and implementation of a CEMP to provide a framework for managing issues including air and noise emissions, visual impacts, access restrictions, and the use and storage of hazardous substances
- development and implementation of a DMP which will detail strategies to minimise potential water quality impacts during dredging, and reduce risks associated with the placement of potentially contaminated dredge material
- development and implementation of a VTMP to provide a framework for the safe operation of marine vessels.

The proponent has also committed to providing compensation to landowners who experience negative economic impacts due to the placement of the dredge pipeline. I support these commitments, and require that they be implemented.

As stated in Section 6 (Dredge material delivery), I have required the proponent to develop and implement a traffic management plan (TMP) in order to reduce the potential impacts to traffic flow, and manage safety risks associated with the haulage of materials and equipment. As stated in Section 7 (Onshore placement of dredge material), I have also required the proponent to undertake a flood risk assessment (FRA) to assess potential changes in flooding characteristics within the Barron River catchment.

As part of the stakeholder engagement activities which are to be detailed in the CSEP, I require the proponent to consult with the Department of Agriculture and Fisheries regarding potential impacts to commercial fishermen, including crabbers, whose livelihoods may be temporarily affected by the proposed dredging and construction works.

## 9.7.2 Operations

The EIS documents have considered the potential risk of the introduction of a new infectious disease (or disease strain) to Cairns by a cruise ship during the operational phase of the project. Overall, the risk was deemed to be low given the existing biosecurity safeguards which are enforced for ships docking at Australian ports.

The increased frequency of cruise ship visitations and greater average passenger loads during the operational phase of the project may also result in an elevated burden on local health services due to an increase in the number of passengers seeking onshore treatment. To ensure that the capacity of the local health services is not adversely affected, I require that the proponent consult with the Cairns Hospital and Health Service and the North Queensland Primary Health Network prior to construction of the project.

## **9.8 Coordinator-General's conclusion: Social impacts**

I am satisfied that the proponent has undertaken adequate community and stakeholder engagement to inform the EIS documents, however I note that a degree of concern regarding the project remains amongst various groups, including some potentially affected stakeholders within the local community and other special interest groups.

I consider that the project will deliver significant social benefits, particularly as a result of increased employment and business opportunities during both construction and operation. I note the proponent's commitment to utilise a local workforce to the extent possible, and to foster opportunities for local suppliers. I consider it unlikely that the project workforce demand will result in local skills shortages or excess demand for housing and accommodation.

I am satisfied that any potential impacts on health and community wellbeing as a result of the project can be appropriately managed through implementation of the commitments which the proponent has made, along with the requirements that I have specified in this report.

I have imposed a condition (Appendix 1) requiring that the proponent prepare a CSEP and update impact mitigation and management strategies based on the outcomes of consultation with stakeholders. I have also imposed a condition requiring that the proponent submit an annual social impact management report (SIMR) on implementation of the proponent's commitments, and the outcomes achieved to mitigate and manage social impacts during the construction and operation of the project.

## 10. Economics

### 10.1 Submissions received

Submissions received on the draft EIS and RDEIS included the following key issues related to economic matters:

- economic modelling may have overstated the benefits of the project
- the need for the project has not been adequately justified as cruise ships can access Cairns by anchoring offshore
- the project could have a negative impact on tourism
- support exists for the project due to the expected economic benefits
- the revised project scope has resulted in a lost opportunity to generate a greater contribution to the Cairns economy.

I have considered all submissions on the draft EIS and RDEIS in my evaluation of the project.

### 10.2 Existing environment

The project would be developed within the Cairns Regional Council area (population 161 932 [2016]) which contributed \$7.8 billion to the Queensland economy in 2015, representing 2.69 per cent of Queensland's gross state product. The Far North Queensland regional economy relies heavily on retail trade and accommodation, and food services which are sectors of high employment vulnerability and are more exposed to economic cycle fluctuations.

Tourism activities contribute significantly to the regional economy as Cairns is a hub for visitors exploring north Queensland. In 2015–16 there were approximately 5 million international and 5.3 million domestic overnight stays recorded in Cairns and total sales within the tourism and hospitality sector were estimated at \$2026.1 million, contributing \$940.2 million (in value-added terms) to the Cairns regional economy.<sup>31</sup>

#### 10.2.1 State government funding

In the 2017-18 State budget, the Government acknowledged the importance of investing in regional infrastructure to support economic development and liveability in the regions. This included a commitment of \$60 million (\$30 million per year over two years) to the Cairns Shipping Development project, subject to the project's business case approval (discussed in Section 10.4.4).

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<sup>31</sup> Cairns Regional Council, Cairns Regional Council economic profile: Cairns Tourism and Hospitality Value, .idcommunity, Cairns Regional Council, Cairns, viewed 2 February 2018. <http://economy.id.com.au/cairns/tourism-value>

## Cruise shipping

The global cruise ship market is in a period of sustained growth, with the Australian market representing a significant portion of that growth. The cruise shipping sector is one of the fastest-growing tourism sectors in the world and Australia is the second fastest-growing market (behind Asia) within the industry.<sup>32</sup> The new Brisbane International Cruise Terminal (BICT) at Luggage Point is expected to triple the size of the Brisbane cruise industry by 2035 and have significant flow-on effects for visits to Cairns.

The EIS documentation identified that cruise ship visits to Trinity Wharf result in greater expenditure in the local economy when compared to ships anchoring at Yorkeys Knob. Most passengers who come to shore are likely to join a land or marine-based tour during their stay, regardless of whether the ship is berthed at Trinity Wharf or offshore. However, when a ship berths at Trinity Wharf, passengers usually stay longer, visit Cairns civic facilities and spend money in the local economy on food, beverages and retail items. It also allows crew to disembark, which cannot occur when the ship is anchored offshore. Expenditure for a ship anchored at Trinity Wharf is estimated to be \$220 per passenger and \$78 per crew member, while expenditure for a ship anchored at Yorkeys Knob is estimated to be \$172 per passenger and \$0 for crew.

## Home porting

In 2016, the Port of Cairns had 12 turnaround cruise ship visits. Turnaround visits are also known as home porting, which occurs when a ship changes over the majority of its passengers while taking on stores, supplies and fuel. The current net present value of existing home porting activities is estimated to be \$492.2 million (generated between 2017 and 2043, in 2016–17 dollars). The pre- and post-cruise passenger expenditure associated with home porting is estimated to have a net present value of \$10.1 million.

## Navy and cargo shipping activities

The HMAS Cairns Royal Australian Navy base is located on the northern shore of Trinity Inlet and is the home port for 14 naval vessels.

Bulk cargo carriers also use the port; however, the size of the carriers accessing the port are restricted by the capacity of the shipping channel.

## 10.3 Methodology

The economic impacts of the project were calculated for the EIS documentation using an input–output model of the Cairns regional economy or Queensland economy where relevant. The EIS documentation presented the net present value of these impacts over the period 2018–43, reported in 2016–17 dollars at 4, 7 and 10 per cent discount rates.

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<sup>32</sup> Cruise Line International Association Australasia (2016), Cruise Industry Source Market Report, Ocean Cruise Passengers, Australia 2015.

The EIS documentation identified the potential economic impacts of the project under various scenarios relating to the construction of the BICT and the continuance of home porting. Given that the BICT was approved via the Queensland Government's Market-Led Proposal process on 25 October 2017 and will commence construction in mid-2018, this report has focused on comparing the 'without the project' scenario with the 'with the project' scenario, that assumes the construction of the BICT and the continuance of home porting.

## 10.4 Potential impacts

The EIS documentation identified that the project would generate \$848.6 million total value to the regional economy from increased expenditure (2017-2043, net present value, 2016–17 dollars) for the Cairns regional economy. These benefits would be generated through channel construction and maintenance, cruise shipping activities, pre-and post- cruise passenger activities and additional cargo and naval activities, as detailed in Table 10.1.

**Table 10.1 Value added economic benefits from increased expenditure directly associated with the project (2017-2043) (Source: RDEIS Table B9-42)**

Economic activity	Net present value (\$ 2016-2017)
Channel construction	\$91.5 million
Channel maintenance	\$1.2 million
Cruise shipping activity	\$728.6 million
Cairns visitation - pre-and post-cruise passenger activities (associated with home porting)	\$10.1 million
Increased cargo ship capacity	\$5.5 million
Navy ship visits	\$11.7 million
<b>Total</b>	<b>\$848.6 million</b>

### 10.4.2 Construction

The EIS documentation reported that project expenditure during the construction period would be \$120 million, and that the project would create up to 195 direct FTE jobs. These economic benefits would be associated with activities including dredging, placement of the dredged material on land, wharf and services upgrades and associated professional services.

Issues were raised by submitters relating to the potential negative economic impacts of the project on tourism—particularly that the dredging during construction could degrade water quality and impact the environment in a way that was detrimental to tourism. The EIS documentation reported that the dredging site is located more than 12 km from major reefs and other areas used for marine-based tourism and that no impacts on reefs and tourism activity are expected.



The economic costs associated with environmental impacts during construction from dredging and the disposal of dredge material were not quantified for the EIS documentation; however I am satisfied that these matters will be adequately addressed in the business case discussed in section 10.4.4.

### 10.4.3 Operation

During operation, economic benefits would be derived from cruise shipping activities, pre- and post- cruise passenger activities, navy and cargo activities and ongoing channel maintenance.

One submission highlighted the lost opportunity associated with the downscaled project scope and suggested that the project should be the first stage of an ongoing expansion of the Port of Cairns to allow for the estimated \$340 million in additional economic benefits associated with catering for Voyager Class cruise ships. However, I note that the RDEIS found that the revised channel provides a much greater rate of return on investment at a substantially lower capital cost than the original channel upgrade proposed in the draft EIS. The revised scope also complies with the changes in Queensland and Commonwealth legislation that occurred after the draft EIS was published.

Submitters also raised the issue that the need for the project had not been adequately demonstrated given that cruise ships can already access Cairns by anchoring offshore at Yorkeys Knob; however, I am satisfied that the economic analysis has demonstrated that there would be economic benefits, including increased passenger days in port, increased direct expenditure, the continuance of home porting and employment benefits in the local economy. These are discussed in more detail below.

#### **Economic impacts from cruise shipping**

The channel modifications would enable vista and grand class cruise ships to access Trinity Wharf instead of anchoring offshore at Yorkeys Knob. This would increase passenger and crew expenditure in Cairns and expenditure on port charges, ship supplies and services and passenger-related services by cruise lines. The availability of a larger capacity port would also attract new cruise ship calls. The EIS documentation reported 80 cruise ship visits in Cairns in 2017. The project would increase cruise ship visits to Cairns from 103 to 183 by 2031.

#### *Increased passenger days in port*

The project is predicted to increase the number of days passengers spend in port by 225 000 days to 335 000 days per annum by 2031, due to the ability for ships to dock and passengers to disembark at Trinity Wharf. This would reduce the transfer fees, travel distance and weather cancellations currently experienced by passengers when anchoring at Yorkeys Knob.

The EIS documentation reported that the medium projections for the annual increase in direct cruise-related expenditure resulting from the project were \$46.5 million in 2021, \$68.1 million in 2026 and \$73.8 million in 2031. The net present value for the direct and indirect impacts of the project from cruise shipping would be \$728.6 million.

### *Continuance of home porting*

The project would allow the port to continue home porting activities beyond 2024 when the older sub-regal-class ships currently home porting in Cairns are expected to be retired. Facilitating access for larger ships to home port in Cairns would prevent the loss of business activities with a net present value of \$492.2 million. This is a benefit of the project that would be additional to the value-added benefits detailed in Table 10.1.

The project would also create opportunities for the future relocation of larger cruise ships to the Australian market including the potential for home porting at the Port of Cairns.

### *Employment benefits*

The EIS documentation reported that the project has the potential to support more than 1535 direct FTE jobs per annum and 1202 indirect jobs within the regional economy by 2031. This includes employment supported as a result of channel maintenance, cruise shipping, induced visitation and navy activities. Submitters raised the issue that input-output modelling can overstate the impacts as it assumes that resources required for the project such as labour and capital are unlimited, and will not be drawn from other activities and sectors of the economy, thereby significantly overstating the economic and employment benefits. As such, I consider that the projected figures may be in the upper range and I look to further analysis in the project's business case to confirm the predicted number of jobs that will be supported.

### **Economic benefits from cargo and navy activities**

The EIS documentation identified additional benefits that would occur as a result of other large ships being able to access the port following channel modifications. These benefits include increased economic efficiency in cargo transport due to cargo carriers being able to carry larger loads, valued as having a net present value of \$5.5 million (2016–17 dollars); and increased potential for Australian and foreign navy ships to berth in Cairns, generating expenditure with a net present value of \$11.7 million (2016–17 dollars).

### **Channel maintenance**

The EIS documentation identified that the annual cost of additional dredging to maintain the channel would be \$150 000, which would benefit both the dredging industry and the Cairns economy. The net present value of channel maintenance is estimated at \$1.2 million (2016–17 dollars).

## **10.4.4 Business case**

A detailed business case for the project is currently being prepared by Building Queensland, an independent statutory body responsible for providing expert advice to Queensland Government agencies, government-owned corporations (including the proponent) and selected statutory authorities. The business case will be developed in accordance with the Building Queensland business case frameworks (<http://buildingqueensland.qld.gov.au/frameworks/>) and will include:

- a full cost–benefit analysis
- an analysis of the demand assessment
- a full financial and commercial assessment, including market considerations and an analysis of delivery options.

## 10.5 Coordinator-General's conclusion: Economics

The EIS documentation demonstrated that the capacity of the existing wharf to accommodate mega class cruise ships is constrained and that the project would facilitate the growth of cruise, navy and large cargo ship visits directly to the Port of Cairns. The project would result in increased expenditure, employment and economic efficiencies and is predicted to support up to 1535 direct FTE jobs per annum, 1202 indirect FTE jobs per annum and contribute \$848.6 million (net present value, 2016–17 dollars) to the regional economy.

In addition, it would prevent the loss of cruise ship home porting worth \$492.2 million due to the increasing trend towards larger cruise ships unable to access the Port of Cairns.

I acknowledge the limitations of the use of input–output modelling for predicting job figures and economic benefits; however, I am satisfied that the EIS documentation has provided sufficient information to indicate that the project would provide significant economic opportunities in the region and provide local employment opportunities.

## 11. Conclusion

In undertaking my evaluation, I have considered the following:

- the EIS documentation, including the draft EIS, revised draft EIS and supplementary information provided by the proponent
- submissions on the EIS documentation and state agency advice.

I am satisfied that the requirements of the SDPWO Act have been met and that sufficient information has been provided to enable the necessary evaluation of potential impacts, and inform the development of mitigation strategies and conditions of approval.

The environmental assessment commenced with the declaration of this project as a coordinated project in September 2012 and has involved a comprehensive body of work by the proponent. More detailed work will occur in the detailed design phase of the project.

I have assessed and considered the potential impacts identified in the EIS documentation and all submissions. I consider that the mitigation measures and commitments proposed by the proponent together with the conditions and recommendations stated in this report would result in overall acceptable outcomes.

I consider that the location of key project components, including the onshore placement of dredge material at the Northern Sands DMPA and Tingira Street DMPA, the pump-out facility, dredge delivery and tailwater discharge pipelines as described in the EIS documentation are appropriate for this project.

Based on the information provided by the proponent and outlined in this evaluation report, I conclude that the project is a vital component of the future growth and economic development of Cairns.

The project has potential to generate economic benefits throughout the region and the state, including employment of 195 direct FTE jobs during construction, 1535 direct FTE jobs per annum and capital expenditure of \$120 million.

Accordingly, I recommend that the Cairns Shipping Development Project proceed, subject to the conditions in Appendix 1 and 2. In addition, I require the proponent's commitments to be fully implemented as presented in the EIS documentation and summarised in Appendix 6 of this report.

To proceed further, the proponent will be required to:

- obtain EPBC Act approval
- obtain the relevant environmental authorities under the EP Act
- obtain the relevant development approvals under the Planning Act.

Copies of this report will be issued to:

- DEE
- DES
- DSDMIP
- CRC.

A copy of this report will also be available on the DSD website at **[www.statedevelopment.qld.gov.au/cairnssdp](http://www.statedevelopment.qld.gov.au/cairnssdp)**

In accordance with section 35A of the SDPWO Act, this report will lapse on 28 February 2022.

# Appendix 1. Imposed conditions

This appendix includes conditions imposed by the Coordinator-General under section 54B of the *State Development and Public Works Organisation Act 1971* (SDPWO Act). In accordance with section 54D of the SDPWO Act, these conditions apply to anyone who undertakes the construction and operational aspects of the project, such as the proponent, an assignee, agent, contractor, subcontractor or licensee of the proponent.

All the conditions imposed in this appendix take effect from the date of this Coordinator-General's evaluation report. These conditions do not relieve the obligation for approvals and licences from relevant authorities required under any other Acts to be obtained for the project.

## Schedule 1. Social impacts

The entity with jurisdiction for conditions in this schedule is the Coordinator-General.

### **Condition 1. Community and stakeholder engagement, and update of impact mitigation strategies**

The purpose of this condition is to ensure that community and stakeholder interests in the project are clearly identified and effectively managed. This condition also ensures that impact mitigation strategies are updated and adapted in response to stakeholder feedback.

- (a) Submit, at least 3 months prior to construction, a community and stakeholder engagement plan (CSEP) to the Coordinator-General for approval.
- (b) The CSEP must include the following:
  - (i) a summary profile of the local community, focusing on potentially affected stakeholder groups
  - (ii) an analysis of key stakeholders and stakeholder issues
  - (iii) engagement schedules and action plans
  - (iv) communication activities and tools
  - (v) roles and responsibilities for engagement
  - (vi) an appropriately scaled complaints management process
  - (vii) objectives and key performance indicators
  - (viii) monitoring and reporting requirements
  - (ix) processes for incorporating stakeholder feedback into the further development of project specific impact mitigation strategies
  - (x) processes for providing advanced notice to potentially impacted stakeholders regarding onshore and offshore access restrictions
  - (xi) a framework for providing timely notification to local industry service providers and job seekers regarding potential project opportunities, and for ensuring that they are aware of the relevant registration and application processes.
- (c) The CSEP is to be made publicly available by the proponent on its website within one month of its approval by the Coordinator-General.
- (d) The CSEP is to be reviewed and, if necessary, updated within six months of the commencement of construction.
- (e) Feedback obtained from stakeholders is to be considered in informing and updating the impact mitigation strategies in the construction environmental management plan (CEMP), dredge management plan (DMP), vessel transport management plan (VTMP), maritime

operations management plan (MOMP), and any other relevant management plans required for the project.

- (f) Prior to any part of project becoming operational, the proponent is to update its operational stakeholder management plans and strategies to ensure that operational matters relating to the project are fully addressed.
- (g) Prior to the commencement of construction, the proponent is to consult with the Department of Agriculture and Fisheries regarding potential impacts to commercial fishermen, including crabbers, who may be temporarily impacted by the proposed dredging and construction works.
- (h) Prior to the commencement of operations, the proponent is to consult with the Cairns Hospital and Health Service, and the North Queensland Primary Health Network, regarding the potential impacts of the predicted increase in passenger numbers on local health services capacity.

**Condition 2. Reporting on the implementation of social impact mitigation measures**

The purpose of this condition is to report on the implementation of measures to mitigate social impacts during the construction of the project.

- (a) The proponent must provide a social impact management report (SIMR) to the Coordinator-General for approval annually, for a period of three years starting from the commencement of construction.
- (b) The SIMR must describe the social impact management strategies and actions implemented, including all social commitments made by the proponent in the EIS documents, and the outcomes achieved to:
  - (i) inform, consult, collaborate and negotiate with stakeholders and the community, and to demonstrate that stakeholder and community concerns have been considered in making decisions to avoid, mitigate and manage social impacts
  - (ii) provide local and regional employment, training, business and industry development opportunities
  - (iii) mitigate and manage any impacts of the project on community health, safety and wellbeing.
- (c) Each SIMR is to be made publicly available on the proponent's website within 1 month of the Coordinator-General's approval under Condition 2(a) during each year of the reporting period.



## Appendix 2. Coordinator-General's stated conditions

### Environmental authority

This schedule includes the Coordinator-General's stated conditions for an environmental authority for Environmentally Relevant Activity 16(1)(d) (dredging) under the *Environmental Protection Act 1994*, stated under section 47C of the *State Development and Public Works Organisation Act 1971*.

### Schedule 1. Environmental authority for capital dredging, dredge delivery pipeline and Tingira Street DMPA

This environmental authority covers the project's capital dredging, delivery of dredge material pipeline and placement of dredge material at Tingira Street Dredge Material Placement Area (DMPA) (Lot 27 on SP218291).

The entity with jurisdiction for conditions in this schedule is the Department of Environment and Science.

#### General conditions

- G1.** Activities conducted under the environmental authority must be conducted in accordance with the following limitations:
- (a) dredging is limited to capital dredging for the purpose of the expansion of the Port of Cairns shipping channel and the Crystal swing basin, and the establishment of the Smith Creek swing basin and wharf berths;
  - (b) dredging may only occur in accordance with the following plan:
    - (i) General Arrangement, prepared by Ports North, dated 08.05.2017, drawing number 921-004 revision B;
  - (c) a total maximum of 1 million cubic metres **as measured *in-situ*** of dredged material may be removed;
  - (d) **dredging** using a trailing suction hopper dredge (TSHD) must not exceed 900,000 cubic metres **as measured *in-situ***;
  - (e) **dredging** may only be undertaken between March and September in any one calendar year;
  - (f) all **dredged material** must be placed in the placement areas as shown on the following plans:
    - (i) Northern Sands Dredged Material Placement Area (DMPA) as shown on: Placement Zone Plan & Volumes, prepared by Flanagan Consulting Group, dated 04.10.2017, drawing number 3527-SK14D;
    - (ii) Tingira Street DMPA as shown on: Tingira Street Dredge Material Placement Areas, prepared by Ports North, dated 5/5/2017, drawing number 921-014 (Figure A3-6 of the revised draft EIS).
  - (g) a maximum of 100,000 cubic metres **as measured *in-situ*** of stiff clay **dredged material** may be placed at the Tingira Street DMPA.

- (h) Pump out and **dredged material** delivery operations and pipeline must not occur outside of the indicative mooring area and pipeline route shown in:
  - (i) Notional Pipeline Route to Temporary Dredge Mooring/Pump Out Facility, prepared by Ports North, dated 01.12.2017, drawing number 921-017-03 revision 0.
- G2.** All reasonable and practicable **measures** must be taken to minimise the likelihood of environmental harm being caused.
- G3.** Any breach of a condition of this environmental authority must be reported to the **administering authority** as soon as practicable within 24 hours of you becoming aware of the breach. **Records** must be kept including full details of the breach and any subsequent actions undertaken.
- G4.** Other than as permitted by this environmental authority, the **release of a contaminant into the environment** must not occur.
- G5.** Environmental monitoring results must be kept until surrender of this environmental authority. All other information and **records** that are required by the conditions of this environmental authority must be kept for a minimum of five (5) years. All information and records required by the conditions of this environmental authority must be provided to the **administering authority**, or **nominated delegate** upon request, within the required timeframe and in the specified format.
- G6.** An **appropriately qualified person(s)** must monitor, record and interpret all indicators that are required to be monitored by this environmental authority and in the manner specified by this environmental authority and the management plans listed in this environmental authority.
- G7.** All ex situ analyses required under this environmental authority must be carried out by a laboratory that has National Association of Testing Authorities (**NATA**) accreditation, or an equivalent accreditation, for such analyses.
- G8.** When required by the **administering authority**, monitoring must be undertaken in the manner prescribed by the **administering authority**, to investigate a report of **environmental nuisance** arising from the **activity**. The monitoring results must be provided to the **administering authority**, or **nominated delegate**, within the required timeframe and in the specified format upon request.
- G9.** The following details of all environmental complaints received must be recorded:
  - (a) date and time the complaint was received
  - (b) name and contact details of the complainant when provided and authorised by the complainant
  - (c) nature of the complaint
  - (d) investigation undertaken
  - (e) conclusions formed
  - (f) actions taken.
- G10.** The **new dredging activity** must not commence unless the placement of the **dredged material** has been fully authorised under all relevant authorities, licences or other permits issued by the Commonwealth or Queensland governments. Evidence of all necessary approvals must be provided to the **administering authority** upon request.
- G11.** The **dredging** and **dredged material** placement **activity** must be undertaken in accordance with written procedures that:
  - (a) identify potential risks to the environment from the **activity** during routine operations, closure and an emergency;

- (b) establish and maintain control **measures** that minimise the potential for environmental harm;
- (c) plant, equipment and **measures** are maintained in a proper and effective condition;
- (d) ensure plant, equipment and **measures** are operated in a proper and effective manner;
- (e) ensure that staff are trained and aware of their obligations under the *Environmental Protection Act 1994*;
- (f) ensure that reviews of environmental performance are undertaken at least monthly during **dredging** and placement of **dredged material** and annually on completion of **dredged material** placement.

**G12. Dredged material** must not be placed at sea.

**G13.** Placement of the **dredged material** must only take place within the locations and for the purposes set out in **Table G1 – Location and purpose of dredged material**

**Table G1 – Location and purpose of dredged material**

Location	Material	Purpose
Northern Sands DMPA located on Lot 2 on RP712954 and Lot 5 on SP245573	Soft clay <b>dredged material</b>	Placement of the dredged material
Tingira St DMPA located on Lot 27 on SP 21829	Stiff clay <b>dredged material</b>	Placement of the dredged material

**G14. Dredged material** must not be **rehandled in waters**, except within the Northern Sands DMPA as shown on the following plan:

- (a) Placement Zone Plan & Volumes, prepared by Flanagan Consulting Group, dated 04.10.2017, drawing number 3527-SK14D

**G15. Sediment plume-associated monitoring (SPAM)** must be undertaken. This must include **continuous logging** at **concern sites** and **control sites** during **dredging**, including a baseline collection phase (baseline-based assessment with **control site**-based checking).

**G16.** Prior to the commencement of the **new dredging activity**, a **Dredge Management Plan** for the **activity** must be developed and implemented in consultation with the **Technical Advisory Group**.

**G17.** The **Dredge Management Plan** mentioned in condition G16 must contain the following:

- (a) Clearly stated aims and objectives of the activity.
- (b) Description of all **dredging** operations including:
  - (i) type of equipment to be used in **dredging**;
  - (ii) volume of material to be removed, and duration and timing of the **dredging** campaign;
  - (iii) methods to be utilised for transporting **dredged material**;
  - (iv) **dredged material** placement methods;
  - (v) **dredged material** placement locations;
  - (vi) standard operating procedures including impact-reduction procedures (including for marine fauna);

- (vii) management of noise generated above and below water by the **dredging**;
- (viii) Description of all **bed levelling** operations including:
  1. type of equipment to be used;
  2. standard operating procedures including impact-reduction procedures (including for marine fauna);
  3. management of noise generated above and below water.
- (c) Georeferenced maps or plans showing:
  - (i) legend, north arrow and scale;
  - (ii) boundaries of **dredging** and **bed levelling** operations;
  - (iii) estimated or modelled risk-based **zones of influence** and **zones of impact** of sediment plumes;
  - (iv) location of the designated placement site;
  - (v) location of sensitive receptors;
  - (vi) all monitoring locations.
- (d) A detailed description of the **sediment plume-associated monitoring program** for **dredging** both TSHD, backhoe dredge (BHD) and **bed levelling** including:
  - (i) sampling regime and methods;
  - (ii) sediment plume model validation;
  - (iii) monitoring sites;
  - (iv) the assessment methodology for the monitoring data;
  - (v) the assessment methodology used to develop trigger values that will define alert levels.
- (e) Data handling and evaluation procedures that demonstrate how monitoring data will be tested against **alert levels**.
- (f) Marine megafauna observations to be made during **dredging** and **bed levelling**
- (g) A detailed description of the **receiving environmental monitoring program (REMP)** for surface water quality and **sensitive receptor** indicators during both **dredging** and **bed levelling** including:
  - (i) the location of concern sites and control sites for monitoring purposes;
  - (ii) sampling regime and methods;
  - (iii) data handling and analytical procedures;
  - (iv) the assessment methodology for the monitoring data that will include evaluation of:
    1. background groundwater quality and **sensitive receptor** indicators at **control sites** and **concern sites**;
    2. the results of monitoring at **concern sites** compared against limits and background indicators;
    3. the suitability of limits and triggers in this authority and the **Dredge Management Plan** to protect **environmental values**.
- (h) Management actions to be initiated if **alert levels** or **trigger values** are exceeded during **dredging** and **bed levelling**.
- (i) Investigations and reporting to be provided to the **administering authority** if limits identified in conditions WT2 are exceeded, including:

- (i) details of the exceedance including recent dredging and bed levelling;
- (ii) investigation and the cause of the exceedance;
- (iii) comparisons of indicators between control sites and concern sites;
- (iv) management measures implemented and proposed to prevent future exceedances.
- (j) Details of the **Technical Advisory Group** members and their respective roles.
- (k) Details of reviews and auditing to evaluate effectiveness of the **Dredge Management Plan** implementation.
- (l) Details of reporting to be provided to the **administering authority** on the effectiveness of the **Dredge Management Plan**.

*Note: The **Dredge Management Plan** is subject to review and amendment as required by changing regulation, monitoring results, commencement of a **new dredging activity**, or **Technical Advisory Group** recommendations.*

**G18.** The **Technical Advisory Group** membership must include independent experts in the fields of:

- (a) coral biology;
- (b) seagrass biology;
- (c) marine megafauna biology (turtles, dugongs and cetaceans);
- (d) coastal hydrodynamics and sediment transport;
- (e) water quality.

**G19.** The **Technical Advisory Group** membership and respective roles must be submitted to the **administering authority** a minimum of 20 business days prior to its first meeting and, if necessary, membership be amended in accordance with any comments made by the **administering authority**.

**G20.** A copy of the **Dredge Management Plan** must be submitted to the **administering authority** at least 50 business days prior to the commencement of the **activity** and, if necessary, amended in accordance with any comments made by the **administering authority** prior to the commencement of **dredging**.

**G21.** The **Dredge Management Plan** must not be implemented or amended in a way that contravenes or is inconsistent with any condition of this environmental authority.

**G22.** Written notification of the commencement date must be provided to the **administering authority** at least five (5) business days prior to establishing a **new dredging activity**.

**G23.** Hydrographic surveys must be prepared by an appropriately certified and registered surveyor of the dredge and **bed-levelling** area and the immediate adjacent area likely to be affected by the **dredging** and **bed-levelling**, prior to commencement of works, and within two (2) months of the completion of the works, and submitted to palm@des.qld.gov.au or mail to:

Department of Environment and Science  
 Permit and License Management  
 Implementation and Support Unit  
 GPO Box 2454  
 Brisbane QLD 4001

**G24.** A report validating the hydrodynamic modelling of the dredge plume detailed in the report Cairns Shipping Development Project Revised Draft Environmental Impact Statement, Appendix AG – Hydrodynamic Modelling Report prepared by FCG and BMT WBM, dated

June 2017, reference R.B22074.012.00.Modelling\_Report.docx, must be submitted to the **Technical Advisory Group** and the **administering authority**:

- (a) within four (4) weeks of the commencement of mechanical **(BHD) dredging**;
- (b) within four (4) weeks of the commencement of TSHD **dredging**.

**G25.** Reports must be provided to the **administering authority**, within the timeframes outlined below, setting out monitoring results and an analysis of the impact prediction in the EIS documents for the Cairns Shipping Development Project compared to the impact outcomes for:

- (a) Dredge plume extent, duration and zone of influence/impact on sensitive receptors – within six (6) months of the completion of the **dredging** program.
- (b) **Sensitive receptor** responses to activities including:
  - (i) Seagrasses – six (6) months after the completion of the **dredging** and placement or placement of **dredged material**, and then annually for two (2) years;
  - (ii) Marine megafauna observations and responses recorded as per the **Dredge Management Plan** – two (2) months after the completion of dredging.

**G26.** You must submit all monitoring and survey data collected to inform the reports required in condition G25, at the time of report submission.

#### Surface Water

**WT1.** Dredging must be managed to not exceed the limits in: **Table WT1 – Sensitive receptor water quality limits- Photosynthetically Active Radiation (PAR)**; and **Table WT2 – Sensitive receptor water quality limits-Turbidity**; and associated monitoring requirements.

**Table WT1 – Sensitive receptor water quality limits- PAR (seagrass meadows)**

Monitoring Location Name	Coordinates (GDA94 decimal degrees)*		Quality characteristics (units)	Limit	Limit type	Minimum monitoring frequency
	Latitude	Longitude				
<i>Halodule uninervis</i> meadow(s)	To be advised (TBA)	TBA	PAR (mol m <sup>-2</sup> day <sup>-1</sup> ) in areas with the seagrass <i>Halodule uninervis</i> present	5	14 day rolling average*	<b>Continuous data logging</b> (at least every 10 minutes) during <b>dredging</b> and for 2 weeks after dredging ceases
			Turbidity (Nephelometric Turbidity Unit (NTU))	Monitor only	Monitor only	<b>Continuous data logging</b> (at least every 10 minutes) during <b>dredging</b> and for 2 weeks after <b>dredging</b> ceases



Monitoring Location Name	Coordinates (GDA94 decimal degrees)*		Quality characteristics (units)	Limit	Limit type	Minimum monitoring frequency
	Latitude	Longitude				
Zostera muelleri meadow(s)	TBA	TBA	PAR (mol m <sup>-2</sup> day <sup>-1</sup> ) in areas with the seagrass <i>Zostera muelleri</i> present	6	14 day rolling average*	<b>Continuous data logging</b> (at least every 10 minutes) during <b>dredging</b> and for 2 weeks after <b>dredging</b> ceases
			Turbidity (Nephelometric Turbidity Unit (NTU))	Monitor only	Monitor only	<b>Continuous data logging</b> (at least every 10 minutes) during <b>dredging</b> and for 2 weeks after <b>dredging</b> ceases

#### Associated monitoring requirements

- (a) \* 14 day rolling average is calculated by averaging the total daily PAR recorded over the previous fourteen days
- (b) Total daily PAR is determined by recording the cumulative total of benthic light received at a site in a 24 hour period.
- (c) Monitoring must be in accordance with the methods prescribed in the latest version of the administrative authority's *Monitoring and Sampling Manual*, including the PAR methods. The 2017 version, or more recent updates of this manual, must be used.
- (d) PAR measurements must be taken just above the canopy height of the surrounding seagrass and at less than one (1) metre above the seabed.
- (e) mol m<sup>-2</sup> day<sup>-1</sup> refers to mol per square metre per day.

**Table WT2 – Sensitive receptor water quality limits- Turbidity**

Monitoring Location Name	Coordinates (GDA94 decimal degrees)*		Quality characteristics (units)	Limit*	Limit type*	Minimum monitoring frequency
	Latitude	Longitude				
Palm Cover (Double Island)	TBA	TBA	Turbidity (NTU)	57	15 day daily rolling median	Continuous <b>data logging</b> (at least every 10 minutes) during <b>dredging</b> and for 2 weeks after <b>dredging</b> ceases
				125	6 day daily rolling median	

Monitoring Location Name	Coordinates (GDA94 decimal degrees)*		Quality characteristics (units)	Limit*	Limit type*	Minimum monitoring frequency
	Latitude	Longitude				
Yorkeys Knob	TBA	TBA	Turbidity (NTU)	58	15 day daily rolling median	Continuous <b>data logging</b> (at least every 10 minutes) during <b>dredging</b> and for 2 weeks after <b>dredging</b> ceases
				100	6 day daily rolling median	
Trinity Bay	TBA	TBA	Turbidity (NTU)	40	15 day daily rolling median	Continuous <b>data logging</b> (at least every 10 minutes) during <b>dredging</b> and for 2 weeks after <b>dredging</b> ceases
				173	6 day daily rolling median	
Upper Trinity Inlet	TBA	TBA	Turbidity (NTU)	12	15 day daily rolling median	Continuous <b>data logging</b> (at least every 10 minutes) during <b>dredging</b> and for 2 weeks after <b>dredging</b> ceases
				26	6 day daily rolling median	
False Cape	TBA	TBA	Turbidity (NTU)	82	15 day daily rolling median	Continuous <b>data logging</b> (at least every 10 minutes) during <b>dredging</b> and for 2 weeks after <b>dredging</b> ceases
				144	6 day daily rolling median	
Cape Grafton	TBA	TBA	Turbidity (NTU)	121	15 day daily rolling median	Continuous <b>data logging</b> (at least every 10 minutes) during <b>dredging</b> and for 2 weeks after <b>dredging</b> ceases
				248	6 day daily rolling median	

### Associated monitoring requirements

- (a) Monitoring must be in accordance with the methods prescribed in the latest version of the administrative authority's *Monitoring and Sampling Manual*, including the background information on water quality measurements using in situ water quality instruments.
- (b) All determinations must employ analytical practical quantification limits of sufficient sensitivity to enable comparisons to be made against the limits relevant to the particular water or sediment quality characteristic.
- (c) \*Limits derived from the 80th and 95th percentile of site-specific baseline dry season water quality data.
- (d) # The 15 and six (6) day daily rolling median is calculated using the median of the daily median over the previous 15 or six (6) days.

**WT2.** Monitoring must be undertaken for the duration of the **dredging** at **sensitive receptor** locations in accordance with: **Table WT1 – Sensitive receptor water quality limits-PAR**; and **Table WT2 – Sensitive receptor water quality limits-Turbidity**; and associated monitoring requirements.

**WT3.** Pump out and **dredged material** delivery operations by the TSHD and pipeline must not cause any release to waters of petroleum products or hydraulic fluids or other hydrocarbons.

### Land

- L1.** The characteristics of the intended **dredged material** must be determined prior to the commencement of a **new dredging activity** under an approved Sediment Sampling and Analysis Plan in accordance with the National Assessment Guidelines for Dredging.
- L2.** The suitability of **dredged material** for placement as planned must be determined prior to the commencement of a **new dredging activity** under an approved Sediment Sampling and Analysis Plan, in accordance with the methodology provided in the latest version of the:
  - (a) National Assessment Guidelines for Dredging
  - (b) *Queensland Acid Sulfate Soil Technical Manual*
  - (c) Any other relevant guidelines specified by the administering authorityThe analytical results for the **dredged material** must be assessed against the appropriate criteria set out in the National Environment Protection (Assessment of Site Contamination) Measure and meet the assessment criteria for land use setting Health Investigation Level A (HILA).
- L3.** A Sediment Sampling and Analysis Plan report for condition L1 and condition L2 must be submitted to the **administering authority** at least 50 business days prior to the commencement of the **new dredging activity**.
- L4.** An Acid Sulfate Soil Management Plan (ASSMP) must be prepared for all **ASS** that may be directly or indirectly disturbed by the activities. The plan must be prepared in accordance with the latest version of the *Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines*.
- L5.** An **appropriately qualified person(s)** must design and be responsible for the implementation of the ASSMP.
- L6.** A copy of the ASSMP must be submitted to the **administering authority** at least 50 business days prior to the commencement of the activity and, if necessary, amended in accordance with any comments made by the **administering authority** prior to the commencement of the activity.

- L7.** Land subjected to the placement of **dredged material** or impacted by disturbance as a result of the activities must be maintained to ensure:
- (a) potential for erosion is minimised;
  - (b) potential for **environmental nuisance** caused by dust is minimised;
  - (c) the quality of water leaving the site, including seepage, does not cause environmental harm;
  - (d) the water quality of any residual water body does not have potential to cause environmental harm;
  - (e) the final landform is stable and is not a risk to public safety.

#### Stormwater

- S1.** Prior to the commencement of any construction, or **dredged material** placement, **you** must develop and implement erosion and sediment controls for the Tingira Street DMPA in accordance with the Best Practice Erosion and Sediment Control (BPESC) guidelines for Australia (International Erosion Control Association) and maintain sediment control devices to achieve best practice design objectives.
- S2.** Storage areas for hazardous contaminants must be located above the 1% **Annual Exceedance Probability** flood level.
- S3.** For the proposed works **you** must only use materials which are free from contaminants as defined under section 11 of the *Environmental Protection Act 1994*.
- S4.** The facilities supporting the **activity** must include a storage area for hazardous contaminants with secondary containment systems to prevent any **release of contaminants into the environment** from the system, or containers within the system, to land, groundwater, or surface **waters**.

#### Waste

- WS1.** All waste generated in carrying out the **activity** must be reused, recycled or removed to a facility or designated onsite location that can lawfully accept the waste.

#### Noise

- N1.** Noise generated by the **activity** must not cause environmental nuisance to any **sensitive place** or **commercial place**.
- N2.** Noise from the activity and associated pumps must not include substantial low frequency noise components, must not exceed the limits identified in **Table N1 – Noise limits**, and must be monitored in accordance with the associated monitoring requirements.

**Table N1 – Noise limits**

Noise level measured in dBA	Monday to Saturday			Sunday and Public Holidays		
	7am – 6pm	6pm – 10 pm	10pm – 7am	8am – 6pm	6pm – 10pm	10pm – 8 am
	Noise measured at the sensitive place					
LAeq adj, 15min	Bkg + 10dBA	Bkg + 5dBA	Bkg + 5dBA	Bkg + 10dBA	Bkg + 5dBA	Bkg + 5dBA
max LpA, 15min	Bkg + 12 dBA	Bkg + 8 dBA	Bkg +8dBA	Bkg + 12dBA	Bkg +8dBA	Bkg +8dBA

Noise level measured in dBA	Monday to Saturday			Sunday and Public Holidays		
	7am – 6pm	6pm – 10 pm	10pm – 7am	8am – 6pm	6pm – 10pm	10pm – 8 am
	Noise measured at the sensitive place					
Noise measured at a commercial place						
LAeq adj, 15min	Bkg + 13dBA	Bkg + 10dBA	Bkg + 10dBA	Bkg + 13dBA	Bkg + 10dBA	Bkg + 10dBA
max LpA, 15min	Bkg + 15dBA	Bkg + 13dBA	Bkg + 13dBA	Bkg + 15dBA	Bkg + 13dBA	Bkg + 13dBA

#### Associated monitoring requirements

- (a) All monitoring must be completed in accordance with the latest version of the administering authority's *Noise Measurement Manual*.
  - (b) All noise monitoring devices must be calibrated correctly.
  - (c) Any noise monitoring of noise emissions from the activity must be completed when the activity is in operation.
  - (d) Monitoring location(s) must be relevant to the matter(s) under investigation.
  - (e) Bkg is LA90 (Background noise measurement)
  - (f) dBA refers to A-weighted decibels.
- N3.** When requested by the **administering authority**, noise monitoring must be undertaken at any **sensitive place** or **commercial place** nominated by the **administering authority**, to determine compliance with noise limits identified in **Table N1 - Noise limits** and results of the monitoring must be submitted to the **administering authority** within 14 days of the request.
- N4.** Noise monitoring must be conducted to determine compliance with noise limits identified in **Table N1 Noise limits** and must be completed in accordance with the latest version of the **administering authority's** *Noise Measurement Manual* and must include the following descriptor characteristic and matters:
- (a)  $LA_{N,T}$  (where N equals the statistical levels of 1, 10 and 90 and T = 15 mins);
  - (b) background noise  $LA_{90}$ ;
  - (c) the level and frequency of occurrence of impulsive or tonal noise and any adjustment and penalties to statistical levels;
  - (d) atmospheric conditions including temperature, relative humidity and wind speed and directions;
  - (e) effects due to any extraneous factors such as traffic noise;
  - (f) location, date and time of monitoring; and
  - (g) if low frequency noise is present,  $Max_{LpLIN,T}$  and one third octave band measurements in  $dB_{(LIN)}$  for centre frequencies in the 10 – 200 hertz range.
- N5.** If monitoring indicates exceedance of the limits in **Table N1 – Noise limits**, then **you** must immediately implement noise abatement measure as set out in the Dredge Management Plan so that emissions of noise from the **activity** do not result in further **environmental nuisance**.

## Air

- A1.** Odours or airborne contaminants must not cause **environmental nuisance** to any **sensitive place** or **commercial place**.

### Matters of State Environmental Significance (MSES)

**MS1.** A buffer area of at least five (5) metres must be maintained at the the placed stiff clay material and the western, eastern and southern boundaries of Lot 27 of SP218291.

**MS2.** Impacts to a **prescribed environmental matter**, protected wildlife habitat for the Beach stone-curlew (*Esacus magnirostris*), are not authorised under this environmental authority or the *Environmental Offsets Act 2014* except those impact(s) specified in **Table MS1 - Impacts to prescribed environmental matters**.

**Table MS1- Impacts to prescribed environmental matters**

Prescribed environmental matter	Location of impacts	Maximum extent of impact	Timing of impact
<b>Protected wildlife habitat</b>			
Habitat for an animal that is vulnerable wildlife – Beach stone-curlew ( <i>Esacus magnirostris</i> )	Mouth of Richter's Creek as shown on the following plan: Cairns Shipping Development Project EIS – Terrestrial Ecology Northern Sands Pipeline – MSES, Map 11, prepared by BioTropica, dated April 2017, revision 0.	0.14 hectares (ha)	Works are to be carried out only between March and September each year to avoid impacts during the breeding season of the Beach stone-curlew.
Habitat for an animal that is vulnerable wildlife – Beach stone-curlew ( <i>Esacus magnirostris</i> )	Tingira Street saltmarsh area, Lot 27 of SP218291, as shown on the following plan: Cairns Shipping Development Project EIS – Terrestrial Ecology Tingira Street – MSES, Map 11, prepared by BioTropica, dated March 2017, revision 0	1.3 ha	Works are to be carried out only between March and September each year to avoid impacts during the breeding season of the Beach stone-curlew.

**MS3.** Unless authorised, **Condition MS2** and **Table MS1 – Impacts to prescribed environmental matters**:

- (a) **You** must take all reasonable and practical measures to avoid and mitigate impacts on **prescribed environmental matters**; and
- (b) **Significant residual impacts** on a **prescribed environmental matter** must be offset in accordance with the *Environmental Offsets Act 2014*, Environmental Offsets Regulation 2014 and the Queensland Government Environmental Offsets Policy.

### Definitions

Note that where a term is not defined, the definition in the Environmental Protection Act 1994, its regulations or environmental protection policies must be used. If a word remains undefined, it has its ordinary meaning.

**Acid Sulfate Soils (ASS)** means soils, sediment or other material containing iron sulphides and/or acidity generated by their breakdown.

Activity means the environmentally relevant **activities** to which the environmental authority relates.



**Administering authority** means the Department of Environment and Science or its successor or predecessors.

**Alert level** represent tiers in a hierarchy of increasing environmental risk and are defined by **trigger values**. Three alert levels (low, moderate, and high) are typically used in a management action framework to indicate adverse conditions and guide management responses that aim to prevent and minimise environmental harm.

**Annual exceedance probability** means the probability that at least one event in excess of a particular magnitude will occur in any given year.

**As measured *in-situ*** refers to the measurement of the undisturbed volume of material to be dredged, as measured in its original place or position in the channel, swing basins and berth areas prior to **dredging**.

**Appropriately qualified person(s)** means a person or persons who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

**Background noise** means noise, measured in the absence of the noise under investigation, as  $LA_{90, adj, T}$  being the A-weighted sound pressure level exceeded for 90 per cent of the time period of not less than 15 minutes, using fast response.

**Bed levelling** means the underwater redistribution of seabed material within a defined area to redistribute material in peaks into nearby seabed troughs.

**Backhoe dredge (BHD)** means water-based excavator mounted on a vessel or pontoon.

**Boundary** means within one metre of the cadastral boundary of the site.

**Bund** means an embankment or earth structure built to prevent the movement of water, liquids or slurries.

**Capital dredging:**

- (a) means **dredging** carried out for the purpose of:
  - (i) creating or enlarging a channel, basin, port, berth or other similar thing; or
  - (ii) removing material that is unsuitable as a foundation for a **port facility**; or
  - (iii) creating a trench for a pipe, cable or tube; or
  - (iv) an **activity** incidental to an **activity** mentioned in subparagraph (i) to (iii); but
- (b) does not include **dredging** carried out for the purpose of:
  - (i) i. maintaining a channel, basin, port, berth or other similar thing for its intended use; or
  - (ii) ii. protecting human life or property.

**Commercial place** means a place used as a workplace, an office or for business or commercial purposes and includes a place within the curtilage of such a place reasonably used by persons at that place.

Concern site means a site where a **sensitive receptor** occurs within the **zone of influence** of a sediment plume.

**Continuous data logging** means to record instrument-derived data in a memory storage device (a data logger). The frequency of data logging may be, for instance, every 10 minutes, but where a logger device is used *in situ*, the frequency may be dependent on the memory storage capacity of the logger and the time between logger retrieval events. Alternatively,

**continuous data logging** may be performed via telemetry, with the data being broadcast to an *ex situ* computer or data logger.

**Control site** refers to a monitoring site located beyond the anticipated **zone of influence** of sediment plumes and has **site pairing** with one or more **test sites** or **sentinel sites**. In monitoring programs, control sites serve the same role as do reference sites but only for a defined subset of indicators.

**Construction or constructed** includes building a new structure and modifying an existing structure, but does not include investigations and testing necessary for the purpose of preparing a design plan.

**Disturbed areas** include areas:

- (a) that are susceptible to erosion;
- (b) that are contaminated by the **activity**; and/or
- (c) upon which stockpiles of soil or other materials are located.

**Dredge Management Plan** is an environmental management plan for the **dredging activity**. It defines and describes the:

- (a) scope, timing and duration of the **dredging** operation;
- (b) sediment plume-associated monitoring programs;
- (c) assessment of data, **trigger values** and **alert levels**,
- (d) management actions that may be required in response to adverse monitoring results.

The **Dredge Management Plan** includes an aim to prevent and minimise environmental harm to **sensitive receptors** as a result of the **dredging activity**.

**Dredged material** means material that has been removed from under surface water, including spoil, other than a mineral within the meaning of any Act relating to mining. Material includes, for example, stone, gravel, sand, rock, clay, mud, silt and soil.

**Dredge footprint** is the area being dredged including batters.

**Dredging** includes extraction of mud, sand, coral, ballast, shingle, gravel, clay, earth and other material from the bed of Queensland tidal and non-tidal **waters**. **Dredging** does not include the banks of a waterway.

**Environmental offset** has the meaning in section 7 of the *Environmental Offsets Act 2014*.

**Environmental nuisance** as defined in Chapter 1 of the *Environmental Protection Act 1994*.

**Environmental value** is:

- (a) a quality or physical characteristic of the environment that is conducive to ecological health or public amenity or safety; or
- (b) another quality of the environment identified and declared to be an **environmental value** under an environmental protection policy or regulation.

**LA<sub>eq, adj, T</sub>** means the adjusted A weighted equivalent continuous sound pressure level **measures** on fast response, adjusted for tonality and impulsiveness, during the time period T, where T is measured for a period no less than 15 minutes when the **activity** is causing a steady state noise, and no shorter than one hour when the approved **activity** is causing an intermittent noise.

**Land** means any **land**, whether above or below the ordinary high-water mark at spring tides (i.e. includes **tidal land**).

**Maximum extent of impact** means the total, cumulative, residual extent and duration of impact to a prescribed environmental matter that will occur over a project's life after all reasonable avoidance and reasonable on-site mitigation measures have been, or will be, undertaken.

**Measures** has the broadest interpretation and includes:

- (a) procedural measures such as standard operating procedures for dredging operations, environmental risk assessment, management actions, departmental direction and competency expectations under relevant guidelines;
- (b) physical measures such as plant, equipment, physical objects (such as bunding, containment systems etc.), ecosystem monitoring and bathymetric surveys.

**Modification or modifying** (see definition of 'construction')

**NATA** means National Association of Testing Authorities.

**New dredging activity** means a **dredging activity** that is currently not underway, the next stage of a **dredging** campaign that is currently underway, or a discretely separate area in a larger dredge campaign that is currently underway. The commencement of **dredging** by a different dredge type than currently operating is also considered a **new dredging activity**.

**Nominated delegate** means another government agency that provides services to the administering authority.

**Northern Sands DMPA** refers to the portion of the **Northern Sands site** that is to be utilised for the purposes of placement of **dredged material** and includes the proposed **bunds** surrounding the placement area as well as a further peripheral area to be utilised for the delivery and tailwater discharge pipe work network.

**Northern Sands site** refers to land covered by Lot 2 on RP712954 and Lot 5 on SP245573 and includes the Northern Sands DMPA.

**Port facility** means a facility or **land** used in the operation or strategic management of a port authority's port. **Port facility** does not include a small-scale **port facility** to be used for a tourism or recreation purpose. Examples of a small-scale **port facility**—boat ramp, boat harbour, marina.

**Receiving waters** means the **waters** into which this environmental authority authorises tailwater releases from the reclamation area

**Prescribed environmental matter** has the meaning in Section 10 of the *Environmental Offsets Act 2014*

**Records** include breach notifications, written procedures, analysis results, monitoring reports and monitoring programs required under a condition of this authority.

**Reference site** refers to a monitoring site located not only beyond the anticipated **zone of influence** of a sediment plume, but also beyond other sources of environmental impacts, and has **site pairing** with one or more **test sites** or **sentinel sites**. In monitoring programs, **reference sites** serve the same role as do **control sites** but can generally be suitable for a broader set of indicators.

**Rehandled** means handling or relocation of **dredged material** from a stockpile.

**Release of a contaminant into the environment** means to:

- (a) deposit, discharge, emit or disturb the contaminant
- (b) cause or allow the contaminant to be deposited, discharged, emitted or disturbed
- (c) fail to prevent the contaminant from being deposited, discharged emitted or disturbed

- (d) allow the contaminant to escape
- (e) fail to prevent the contaminant from escaping.

**Sediment plume-associated monitoring (SPAM)** means environmental monitoring associated with risk management of sediment plume-associated impacts.

**Sediment plume-associated impacts** are impacts associated with sediment plumes including turbidity and suspended solids concentrations, light attenuation or sedimentation rates elevated above either **control site** or **reference site** readings or baseline conditions for an equivalent time of year. Where **dredged material** possesses acid sulfate soil-related properties, **sediment plume-associated impacts** may also include pH, dissolved oxygen and metal and metalloid-related toxicity impacts.

**Sensitive place** includes the following and includes a place within the curtilage of such a place reasonably used by persons at that place:

- (a) a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises;
- (b) a motel, hotel or hostel;
- (c) a kindergarten, school, university or other educational institution;
- (d) a medical centre or hospital;
- (e) a protected area under the *Nature Conservation Act 1992*, the *Marine Parks Act 2004* or a World Heritage Area;
- (f) a public park or garden;
- (g) for noise, a place defined as a **sensitive receptor** for the purposes of the Environmental Protection (Noise) Policy 2008.

**Sensitive receptor** includes biological sensitive receptors together with other **environmental values** sensitive to the effects of dredge-generated **sediment plume-associated impacts**.

**Sentinel site** is a **test site** that is situated between the disturbance source and the **sensitive receptor** and serves to provide earlier warning of developing adverse conditions than does a **test site**.

**Significant residual impacts** has the meaning in section 8 *Environmental Offsets Act 2014*.

**Site pairing** refers to monitoring sites that have a functional control-impact relationship, for example, **Control site** A is referenced to assess monitoring data collected from Concern Sites AA and AB, thus, **Concern Sites** AA and AB share **site pairing** with **Control Site** A.

**Technical advisory group** means an assembly of **appropriately-qualified persons** representing experts in various scientific fields, formed to be capable of assessing **sediment plume-associated monitoring** data and presenting advice relevant to conducting the **dredging** campaign and protecting **sensitive receptors** as directed under this authority and the **Dredge Management Plan**.

**Test site** is a **concern site** that functions as a test point for compliance, is a monitoring site situated within the area where a **sensitive receptor** occurs and where environmental monitoring-related assessment criteria (e.g. **trigger values**) apply.

**Tidal land** means **land** that is submerged at any time by tidal **water**.

**Tidal water** means the sea and any part of a harbour or **watercourse** ordinarily within the ebb and flow of the tide at spring tides (as defined in the *Coastal Protection and Management Act 1995*).

**Trigger values** are physicochemical, indicator-specific measurement values used to indicate a condition where an **environmental value** or **sensitive receptor** may be at low, moderate or high risk, or some other risk-related indicator.

**Void** means any constructed, open excavation in the ground.

**Watercourse** has the meaning in Schedule 4 of the *Environmental Protection Act 1994* and means:

- (a) a river, creek or stream in which water flows permanently or intermittently—
  - (i) in a natural channel, whether artificially improved or not; or
  - (ii) in an artificial channel that has changed the course of the **watercourse**.
- (b) **watercourse** includes the bed and banks and any other element of a river, creek or stream confining or containing water.

**Waters** includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water, natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater and any part thereof.

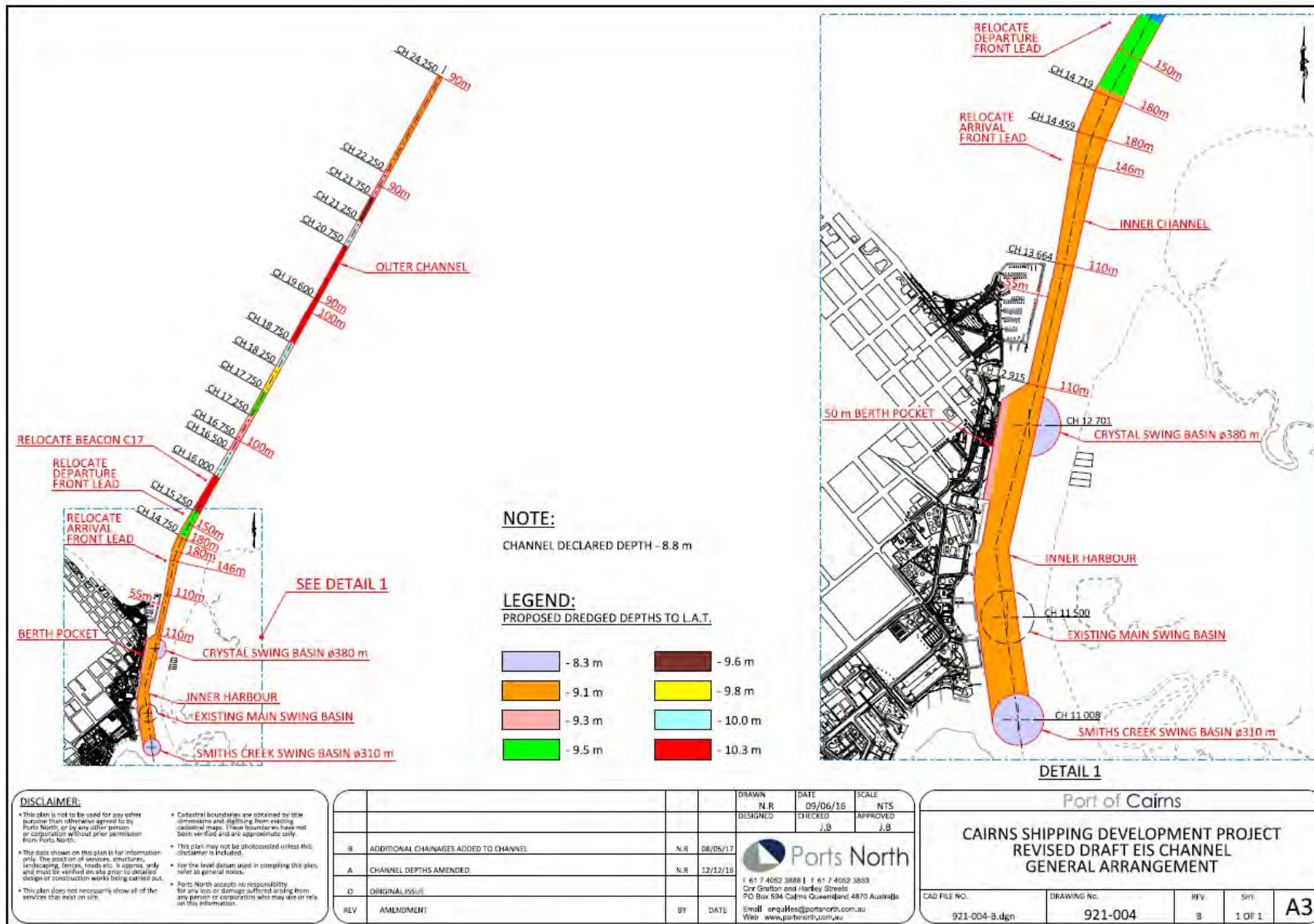
**You** means the holder of the environmental authority.

**Zone of influence** of a sediment plume is, in its broadest application, defined by the **dredge footprint** and the area beyond the dredge footprint where at least some level of **sediment plume-associated impacts** are expected to occur. The overall zone of influence may be broken down into more risk-relevant

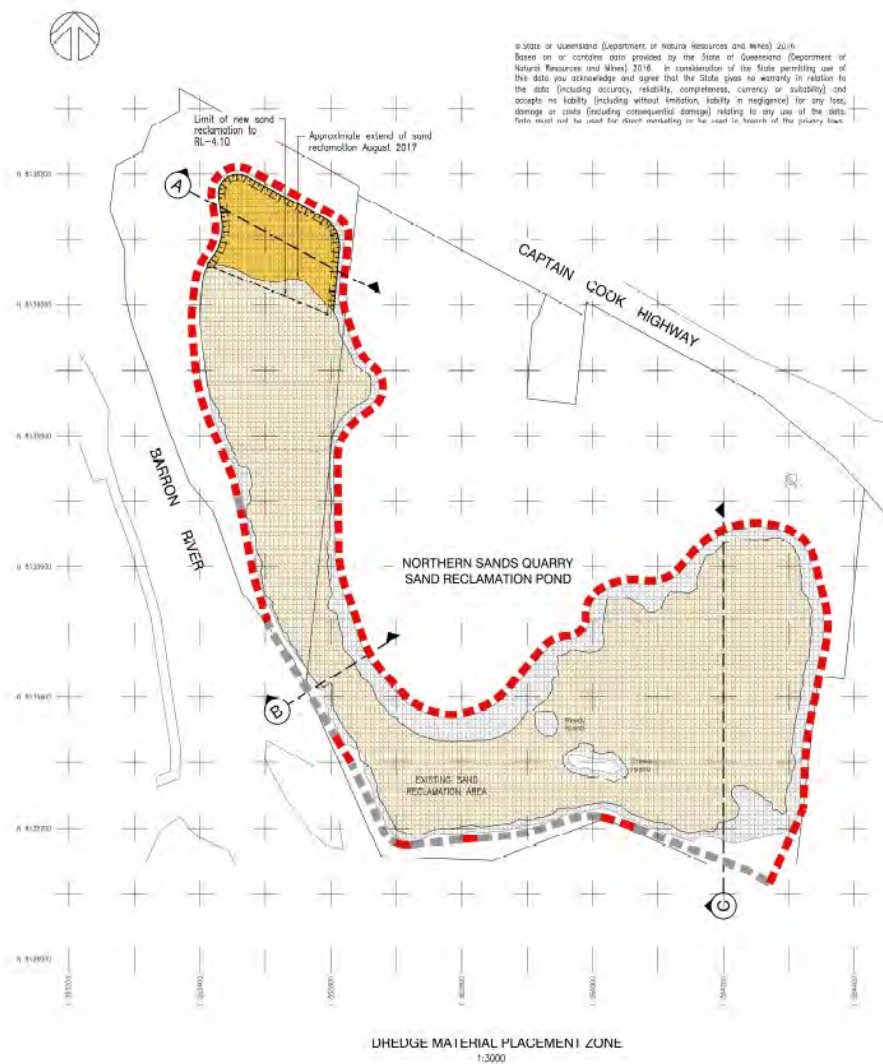
**Zone of impact** sub-categories, such as the *Zone of Unavoidable Loss* (the **dredge footprint** and immediately adjacent areas), the *Zone of Moderate Impact*, or the *Zone of Low Impact*, with each zone being defined according to its purpose or role in environmental management.

**Zone of impact:** See zone of influence definition.









LEVEL (AHD) (m)	VOLUME BELOW (m <sup>3</sup> )	COMMENT
5.50	2,851,218	Top of Bund
5.07	2,704,281	Top of Material at end of placement
5.00	2,678,022	
4.50	2,459,222	
4.07	2,347,020	Top of Material at end of placement
4.00	2,322,488	
3.68	2,214,742	Top of Water at end of 2019
3.50	2,149,522	
3.00	1,950,295	
2.68	1,878,100	Top of Material at end of 2019
2.50	1,813,865	
2.00	1,650,110	
1.50	1,489,590	
1.00	1,332,605	
0.50	1,182,965	
0.00	1,044,381	Lowest Groundwater Level
-0.50	905,260	
-0.59	882,650	Top of Material at end of settlement
-1.00	789,307	
-1.50	637,029	
-2.00	518,748	
-2.50	418,862	
-3.00	340,807	
-3.50	278,403	
-4.00	226,313	
-4.50	180,502	
-5.00	161,571	
-5.50	136,119	
-6.00	113,693	
-6.50	94,418	
-7.00	77,728	
-7.50	64,196	
-8.00	52,556	
-8.50	41,997	
-9.00	32,618	
-9.50	25,109	
-10.00	19,484	
-10.50	14,766	
-11.00	11,156	
-11.50	8,191	
-12.00	5,898	
-12.50	3,849	
-13.00	2,357	
-13.50	1,121	
-14.00	225	
-14.50	0	

#### LEGEND

- EXISTING SAND RECLAMATION AREA (approx 26.2ha)
- FUTURE SAND RECLAMATION AREA (approx 7.4ha)
- UNDEPOSITED MATERIAL PLACEMENT ZONE (approx 34.5ha - Surface Area at RL 3.50)
- EARTH BUND (RL 5.50 - approx 36,000m<sup>2</sup>)
- EXISTING EARTH BUND (RL 5.50 or greater)

#### NOTES

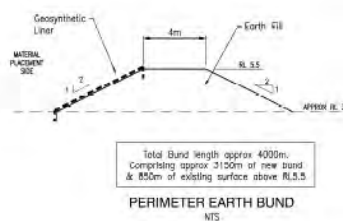
- Volumes shown are approximate only and based on a combination of site hydrographic survey and LIDAR survey.
- For Cross Sections depicting placement of dredged material at weekly intervals, refer Day 3527-SK15.

**CONCEPT ONLY**



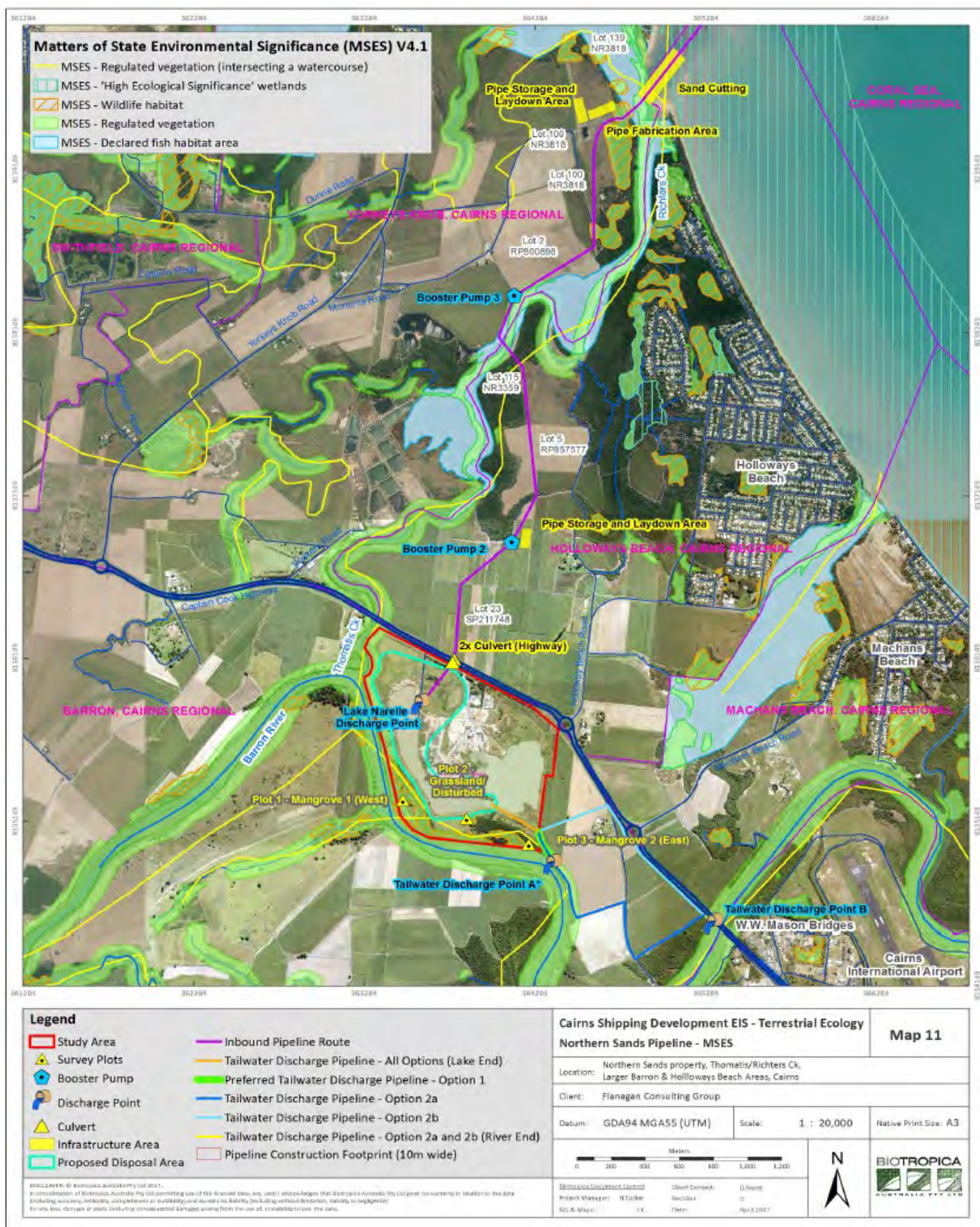
**NORTHERN SANDS**  
Dredge Material Placement  
Placement Zone Plan and Volumes

**3527-SK14D** 1:3000  
A1 Full Size  
Acad No: 3527-SK14D 4 October 2017

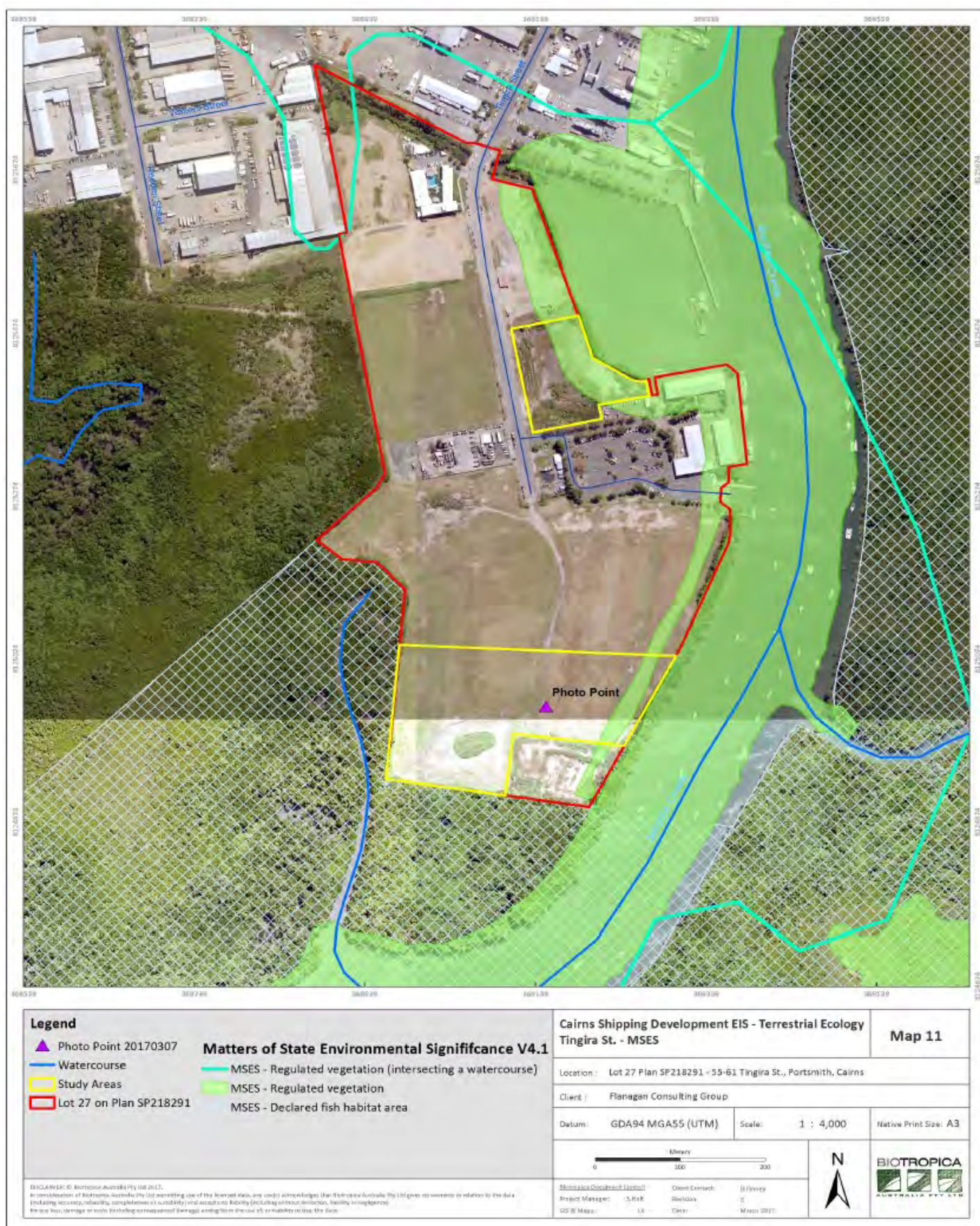














## Schedule 2. Environmental authority for placement of dredge material at Northern Sands DMPA

This schedule includes the Coordinator-General's stated conditions for an environmental authority for Environmentally Relevant Activity 16(1)(d) (dredging) under the *Environmental Protection Act 1994*, stated under section 47C of the *State Development and Public Works Organisation Act 1971*.

This environmental authority covers the onshore placement of dredged material at the Northern Sands DMPA; and the release of dredge tailwater from the Northern Sand DMPA (Lot 2 on RP712954, Lot 5 on SP245573 and Lot 6 on SP254473).

The entity with jurisdiction for conditions in this schedule is the Department of Environment and Science.

### General conditions

- G1. Activities** conducted under the environmental authority must be conducted in accordance with the following limitations
- (a) all **dredged material** must be placed in the Northern Sands DMPA placement areas as shown on the following plan:  
Placement Zone Plan & Volumes, prepared by Flanagan Consulting Group, dated 04.10.2017, drawing number 3527-SK14D;
  - (b) a total maximum of 900,000 cubic metres **as measured in-situ** of dredged material from the Cairns Shipping Development Project may be placed.
- G2.** All reasonable and practicable **measures** must be taken to minimise the likelihood of environmental harm being caused.
- G3.** Any breach of a condition of this environmental authority must be reported to the **administering authority** as soon as practicable within 24 hours of **you** becoming aware of the breach. **Records** must be kept including full details of the breach and any subsequent actions undertaken.
- G4.** Other than as permitted by this environmental authority, the **release of a contaminant into the environment** must not occur.
- G5.** Environmental monitoring results must be kept until surrender of this environmental authority. All other information and **records** that are required by the conditions of this environmental authority must be kept for a minimum of five (5) years. All information and **records** required by the conditions of this environmental authority must be provided to the **administering authority**, or **nominated delegate** upon request, within the required timeframe and in the specified format.
- G6.** All ex situ analyses required under this environmental authority must be carried out by a laboratory that has **National Association of Testing Authorities (NATA)** accreditation, or an equivalent accreditation, for such analyses.
- G7.** When required by the **administering authority**, monitoring must be undertaken in the manner prescribed by the **administering authority**, to investigate a report of **environmental nuisance** arising from the **activity**. The monitoring results must be provided to the **administering authority**, or **nominated delegate**, within the required timeframe and in the specified format upon request.
- G8.** An **appropriately qualified person(s)** must monitor, record and interpret all indicators that are required to be monitored by this environmental authority and in the manner specified by this environmental authority and the management plans listed in this **environmental authority**.
- G9.** The following details of all environmental complaints received must be recorded:

- (a) date and time the complaint was received
- (b) name and contact details of the complainant when provided and authorised by the complainant
- (c) nature of the complaint
- (d) investigation undertaken
- (e) conclusions formed
- (f) actions taken.

**G10.** The **dredged material** placement **activity** must be undertaken in accordance with written procedures that:

- (a) identify potential risks to the environment from the **activity** during routine operations, closure and an emergency;
- (b) establish and maintain control **measures** that minimise the potential for environmental harm;
- (c) ensure plant, equipment and **measures** are maintained in a proper and effective condition;
- (d) ensure plant, equipment and **measures** are operated in a proper and effective manner;
- (e) ensure that staff are trained and aware of their obligations under the *Environmental Protection Act 1994*;
- (f) ensure that reviews of environmental performance are undertaken at least monthly during placement of **dredged material** and annually on completion of **dredged material** placement.

**G11.** Prior to the commencement of works, **you** must submit Registered Professional Engineer of Queensland (RPEQ) certified plans prepared by a registered engineer for the following infrastructure to palm@ehp.qld.gov.au or mail to:

Department of Environment and Science  
 Permit and License Management  
 Implementation and Support Unit  
 GPO Box 2454  
 Brisbane Qld 4001

The relevant infrastructure are those whose purpose includes:

- (a) the containment of **dredged material**;
- (b) settlement of **dredged material**;
- (c) discharge of saline tail water.

**G12.** Any infrastructure specified in **Condition G11** must be maintained to the certified design.

**G13.** Within two weeks of the completion of construction **you** must submit "As Constructed drawings" for the relevant infrastructure mentioned in **G11** to palm@ehp.qld.gov.au or mail to:

Department of Environment and Science  
 Permit and License Management  
 Implementation and Support Unit  
 GPO Box 2454  
 Brisbane Qld 4001



- G14.** Decommissioning of the bunds surrounding the Northern Sands DMPA must not occur until water in the placement area is maintained at a level that is at least 600 millimetres (mm) below final ground level.
- G15.** Placement of the **dredged material** must only take place within the locations and for the purposes set out in **Table G1 – Location and purpose of dredged material**.

**Table G1 – Location and purpose of dredged material**

Location	Material	Purpose
Northern Sands DMPA located on Lot 2 on RP712954 and Lot 5 on SP245573	Soft clay <b>dredged material</b>	Placement of the dredged material

- G16.** Reports must be provided to the **administering authority**, within the timeframes outlined below, setting out monitoring results and an analysis of the impact prediction included in the EIS documents for the Cairns Shipping Development Project compared to the impact outcomes for:
- (a) Northern Sands DMPA surface tailwater quality beyond the predicted mixing zone – two (2) months after the completion of all tailwater releases.
  - (b) **Northern Sands site** groundwater plume contamination levels and extent – annually on completion of the placement of **dredged material** at the **Northern Sands DMPA**.
  - (c) **Sensitive receptor** responses to activities including:
    - (i) Riparian vegetation
    - (ii) upstream of the Northern Sands DMPA tailwater outlet works – two (2) months after the completion of **dredged material** placement;
    - (iii) within and adjacent to the predicted groundwater plume at the **Northern Sands DMPA** - two (2) months after the completion of **dredged material** placement.
- G17.** You must submit all monitoring and survey data collected to inform the reports required in condition G16, at the time of report submission.
- G18.** The activity must not be carried out until you have given **financial assurance** to the **administering authority** as security for compliance with this environmental authority and any costs or expenses, or likely costs or expenses, mentioned in section 298 of the *Environmental Protection Act 1994*.
- G19.** The amount of **financial assurance** must be reviewed by you on each anniversary of the take effect date of the environmental authority or when requested by the **administering authority**.

#### **Surface water**

- WT1.** The only contaminants to be released to surface waters from the placement and management of **dredged material** are tailwater releases from the Northern Sands DMPA to the Barron River in accordance with **Table WT1 – Surface water release limits** and the associated monitoring requirements.

**Table WT1 – Surface water release limits**

Monitoring Location name	Release Point(s) Description (GDA94 decimal degrees)*		Quality characteristic (units)	Limit	Limit Type	Minimum Monitoring Frequency
	Latitude	Longitude				
End of pipe*	To be advised (TBA)	TBA	pH	6.5–8.5	Range	<b>Continuous data logging</b> during releases
			Dissolved oxygen	60-105%	Range	<b>Continuous data logging</b> during releases
			Turbidity	50 nephelometric turbidity units (NTU)	Maximum	<b>Continuous data logging</b> during releases
			Total Suspended Solids	mg/l monitor only	N/A	Weekly during releases
			Ammonia N	460 µg/L	Maximum	Weekly during releases
			Electrical conductivity or salinity	µS/cm or mg/L Monitor only	N/A	<b>Continuous data logging</b> during releases
			Temperature	Monitor only	N/A	<b>Continuous data logging</b> during releases

\*Decimal degrees to be provided to a minimum of 4 decimal places.

Surface water release limits associated monitoring requirements

- Monitoring must be in accordance with the methods prescribed in the latest version of the administrative authority's *Monitoring and Sampling Manual*;
- all determinations must employ analytical practical quantification limits of sufficient sensitivity to enable comparisons to be made against the limits relevant to the particular water quality characteristic;
- monitoring must be undertaken during a release and at the frequency stated;

- (d) suspended solids samples must be taken so as to allow a correlation with turbidity levels;
  - (e) all monitoring devices must be calibrated and maintained according to the manufacturer's instruction manual.
  - (f) \* as shown on plan:  
Barron Delta DMPA Dredged material Delivery and Tailwater Discharge Location Plan, prepared by Flanagan Consulting Group, dated 07.10.2017, drawing number 3527-02-10a
  - (g) % refers to percent; mg/L refers to milligrams per litre; µg/L refers to micrograms per litre; µS/L refers to micro-siemens per centimetre.
- WT2.** The maximum tailwater release volume from the end of pipe referred to in **Table WT1 – Surface water release limits** must be monitored and must not exceed 87 megalitres per day in total.
- WT3.** Tailwater releases from the discharge point at the **Northern Sands DMPA** must cease within three (3) months of the cessation of the **dredged material** placement from the Cairns Shipping Development project.
- WT4.** Within 30 business days of commencing tailwater releases a report must be submitted to the **administering authority** that identifies and describes any adverse impacts to **receiving water** environmental values due to the authorised tailwater release.
- The report must:
- (a) describe concentrations of toxicants in the tailwater releases and the receiving environment;
  - (b) define the spatial extent of the mixing zone using in-situ measurements;
  - (c) compare the mixing zone defined from in-situ measurements to that modelled in the Cairns Shipping Development Project Revised Draft Environmental Impact Statement. Appendix AJ: Marine Water Quality Impact Assessment Report (2017) Marine Water Quality Impact Assessment-Technical Report, prepared by BMT WBM, Reference: R.B22074.007.02.Marine WQ Impact Assessment.docx; Date: June 2017;
  - (d) assess the suitability of current tailwater release limits outlined in **Table WT1 – Surface water release limits** to protect receiving water **environmental values**;
  - (e) meet the minimum data requirements outlined in section 4.4.3 of the Queensland Water Quality Guidelines (2009) and define the mixing zone according to the **administrative authority's** Wastewater Release to Queensland Waters Technical Guideline (2016).
- WT5.** In addition to **Condition WT1**, and **Table WT1 – Surface water release limits**, the release to waters must not:
- (a) have any other properties at a concentration that is capable of causing environmental harm;
  - (b) produce any slick or other visible evidence of oil or grease, nor contain visible floating oil, grease, scum, litter or other visually objectionable matter.
- WT6.** All contaminants released from the end of pipe referred to in **Table WT1 – Surface water quality release limits**, must be released through a proper and effective diffuser.
- Groundwater**
- GW1.** In carrying out this activity there must be no impact to the values of groundwater beyond the **boundary** of Lot 2/RP712954 and Lot 5/SP245573.

- GW2.** You must implement a groundwater monitoring program (GWMP) capable of sufficiently monitoring both lateral and vertical impacts to groundwater:
- (a) at the **Northern Sands site**; and
  - (b) in the area surrounding the Northern Sands site.
- GW3.** An **appropriately qualified person(s)** must design and supervise the installation and implementation the GWMP mentioned in Condition GW2 in consultation with the **Technical Advisory Group**.
- GW4.** A copy of the GWMP must be submitted to the **administering authority** at least 50 business days prior to the commencement of the activity at the **Northern Sands DMPA** and be amended in accordance with comments made by the **administering authority** prior to commencement of the activity at the **Northern Sands DMPA**.
- GW5.** The GWMP mentioned in Condition GW2 must include a detailed description of groundwater monitoring methodology for the **Northern Sands site** including:
- (a) sampling regime and methods;
  - (b) groundwater plume model calibration/validation;
  - (c) description and justification of monitoring bore placement to include an assessment of potential lateral impacts and early warning of excessive contaminant migration;
  - (d) description and justification of monitoring bore design to enable the assessment of potential vertical impacts to groundwater (i.e. nested wells);
  - (e) the assessment methodology for the monitoring data;
  - (f) the assessment methodology used to develop **trigger values** that will define early warning **alerts** to confirm the extent of groundwater impact will be maintained within the site boundary;
  - (g) data handling and evaluation procedures that demonstrate how monitoring data will be tested against **alert levels**;
  - (h) the suitability of triggers to protect environmental values;
  - (i) management actions, contingencies and mitigations to be implemented if **alert levels or trigger values** are exceeded, or actions are required to prevent the off-site migration of contaminants;
  - (j) notification commitments to report alerts levels or **trigger value** exceedances to the **administering authority**;
  - (k) auditing commitments.
- GW6.** The GWMP mentioned in Condition GW2 must include,
- (a) The installation and monitoring of sufficient nested bores surveyed to Australian height datum and provide:
    - (i) monitoring bore construction details;
    - (ii) a table outlining monitoring bore survey data including topography in metres above Australian Height Datum (**m AHD**) and Global Positioning System (GPS) coordinates;
    - (iii) an appropriately scaled map of the monitoring locations, including locations beyond the **boundary** of Lot 2/RP712954 and Lot 5/SP245573.
  - (b) The establishment of **trigger values** for individual monitoring bores for all contaminants of potential concern in accordance with the latest version of the **administrative authority's** guideline titled Using monitoring data to assess groundwater quality and potential environmental impacts.

- (c) The establishment of **lowest permanent watertable** (in **m AHD**) in the surrounding area.
- (d) The collection of 12 months of baseline groundwater monitoring prior to starting the activity.
- (e) Baseline water level contour plans (monthly for a minimum of 12 months) showing hydraulic gradients and the direction of the groundwater flow (in **mAHD**) within the Northern Sands site.

**GW7.** The GWMP mentioned in condition GW2 must include, but not be limited to, the monitoring of parameters outlined in **Table GW1 Ground Water Monitoring Requirements** at all bores.

**Table GW1 – Groundwater monitoring requirements**

Quality characteristic group Quality characteristic		Monitoring frequency		
		For 12 months prior to placement of <b>dredged</b> material	During placement of <b>dredged</b> material and two weeks following cessation of placement of dredged material	Until it has been demonstrated* that there are no changes to the established background groundwater quality and quantity (baseline monitoring required in <b>Condition GW6</b> ), within the boundary of the site
Water level and physicochemical parameters	Electrical conductivity $\mu\text{S/cm}$	Hourly via data logger	Hourly via data logger	Hourly via <b>continuous data logging</b>
	pH			
	Groundwater (in <b>m AHD</b> )			
physicochemical parameters	Dissolved oxygen	Monthly	Weekly	Weekly
	Redox			
	Temperatures			
Major Ions	Calcium	Monthly	Weekly	Monthly
	Magnesium			
	Sodium			
	Potassium			
	Chlorine			
	Sulfate			
	Alkalinity			
Metals	Arsenic	Monthly	Weekly	Monthly
	Cadmium			
	Chromium			
	Copper			
	Mercury			
	Nickel			
	Lead			
	Zinc			



	Aluminium			
	Iron			

#### Associated monitoring requirements

- (a) Monitoring must be in accordance with the methods prescribed in the latest version of the **administrative authority's** guideline titled Using monitoring data to assess groundwater quality and potential environmental impacts.
- (b) All determinations must employ analytical practical quantification limits of sufficient sensitivity to enable comparisons to be made against the limits relevant to the particular water quality characteristic.
- (c) \*in accordance with the methodology of the DSITI (2017) guideline titled: Using monitoring data to assess groundwater quality and potential environmental impacts. Version 1. Department of Science, Information Technology and Innovation (DSITI), Queensland Government, Brisbane.
- (d)  $\mu\text{S/cm}$  refers to micro-siemens per centimetre.

**GW8.** A report detailing the findings of the GWMP, and validation of the groundwater model prepared for the Northern Sands DMPA as detailed in the report Cairns Shipping Development Project Revised Draft Environmental Impact Statement, Appendix AK-Groundwater Impact Assessment: Northern Sands DMPA Report (2017), dated 2 June 2017, reference Report No. 1546223-023-R-Rev0, must be submitted to the **administering authority** within two (2) months of the completion of **dredged material** placement.

**GW9.** A report detailing the findings of the GWMP must be submitted to the **administering authority** annually after the completion of **dredged material** placement until it has been demonstrated that there are no changes to the established background groundwater quality and levels (background monitoring required in **Condition GW6** as a result of activities authorised for this authority) within the boundary of the **Northern Sands site**, in accordance with the methodology of the DSITI (2017) guideline titled: Using monitoring data to assess groundwater quality and potential environmental impacts. Version 1. Department of Science, Information Technology and Innovation (DSITI), Queensland Government, Brisbane.

**GW10.** The report referred to in **Condition GW9** must include water level contour plans prepared at the following intervals:

- (a) weekly for the duration of the dredge material placement;
- (b) weekly for two (2) months following cessation of placement of dredged material;
- (c) monthly thereafter.

**GW11.** The **Technical Advisory Group** membership must include independent experts in the fields of:

- (a) **acid sulfate soil (ASS)** treatment and management;
- (b) groundwater;
- (c) water quality.

**GW12.** The **Technical Advisory Group** membership and respective roles must be submitted to the **administering authority** a minimum of 20 business days prior to its first meeting and, if necessary, membership be amended in accordance with any comments made by the **administering authority**.

#### Land

**L1.** The characteristics of the intended **dredged material** must be determined prior to the commencement of a **new dredging activity** under an approved Sediment Sampling and



Analysis Plan (SSAP) in accordance with the *National Assessment Guidelines for Dredging*.

- L2.** The suitability of **dredged material** for placement as planned must be determined prior to the commencement of a **new dredging activity** under an approved Sediment Sampling and Analysis Plan, in accordance with the methodology provided in the latest version of the:
- (a) *National Assessment Guidelines for Dredging*
  - (b) *Queensland Acid Sulfate Soil Technical Manual*
  - (c) Any other relevant guidelines specified by the administering authority
- The analytical results for the dredged material must be assessed against the appropriate criteria set out in the National Environment Protection (Assessment of Site Contamination) Measure (NEPM) and meet the assessment criteria for land use setting Health Investigation Level A (HILA).
- L3.** A Sediment Sampling and Analysis Plan report for **Condition L1 and Condition L2** must be submitted to the **administering authority** at least 50 business days prior to the commencement of the **new dredging activity**.
- L4.** Any **dredged material** that settles above -1m below the **lowest permanent watertable** within the **Northern Sands DMPA** must be sampled and laboratory analysed to determine the presence or absence of **ASS** consistent with the:
- (a) **ASS verification testing** program; and
  - (b) the latest version of *Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines and Laboratory Guidelines*
- L5.** **Dredged material** placed above -1m below the **lowest permanent watertable** containing **ASS** material where the laboratory analysis shows the **acid neutralising capacity** does not exceed **existing acidity** plus **potential acidity** by a minimum factor of 1.5, must be treated in accordance with:
- (a) the **ASS verification testing** program;
  - (b) the latest edition of the *Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines*.
- L6.** At least 1m of water must be maintained over the placed **dredged material** until the requirements of **Condition L5** have been met.
- L7.** You must prepare and implement an Acid Sulfate Soil Management Plan (ASSMP) for all ASS material that may be directly or indirectly disturbed by the activities. The plan must be prepared in accordance with
- (a) the latest version of the *Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines*;
  - (b) surface water release limits for settled dredge tailwater set out in **Table WT1 – Surface water release limits**.
- L8.** The ASSMP mentioned in condition L8 must address the following matters:
- (a) Identify all actual and potential releases of contaminants associated with the **dredging** activity and the placement of dredged material and any potential environmental impacts, including to:
    - (i) groundwater;
    - (ii) seepage to surface water bodies; and
    - (iii) any surface water releases.

- (b) Define the proposed actions to prevent the likelihood of environmental harm resulting from the activities.
  - (c) Nominate an appropriate geotechnical criteria for the geotechnical certification by a RPEQ certified engineer specialising in geotechnical engineering to verify **dredged material** is stable and suitable for final land use.
  - (d) For the period water cover in the **Northern Sands DMPA** is to be used to prevent oxidation of **ASS**, include management measures including the source of water that will be used to ensure an appropriate water cover.
  - (e) Describe an **ASS verification testing** program at Northern Sands DMPA. The **ASS verification testing** program must:
    - (i) apply to all **dredged material** to be placed above -1m AHD above the **lowest permanent watertable**;
    - (ii) be consistent with the latest version of the *Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines*;
    - (iii) describe the sampling methodology;
    - (iv) include ASS sampling at a minimum rate of one sample per 2,500m3 of **dredged material**;
    - (v) describe the proposed treatment and neutralisation methodology where the **acid neutralising capacity** does not exceed **existing acidity** plus **potential acidity** by a minimum factor of 1.5.
  - (f) List equipment to be used for application and incorporation of neutralising agent.
  - (g) Provide detail on the incorporation method, liming rates and verification of quantities.
  - (h) Describe the sampling technique and what type of analysis will be used.
  - (i) Describe the monitoring program, planned mitigation and treatment methodologies (if required) to achieve surface water release limits for settled dredge tail-water as set out in **Table WT1 – Surface water release limits**.
  - (j) Outline the inclusions to be incorporated into a **closure report** including **handover testing**, validating the appropriate treatment of all **ASS**.
- L9.** An **appropriately qualified person(s)** must design and be responsible for the implementation of the ASSMP mentioned in condition L8.
- L10.** A copy of the ASSMP mentioned in condition L8 must be submitted to the **administering authority** at least 50 business days prior to the commencement of the **activity** and, if necessary, amended in accordance with any comments made by the **administering authority** prior to the commencement of the activity.
- L11.** An **ASS closure report** must be submitted to the administering authority within two (2) years of the completion of the **dredged material** placement or another period agreed to by the **administrative authority**.
- The **ASS closure report** must:
- (a) be in accordance with the latest version of the *Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines*;
  - (b) include **handover testing** undertaken by an independent third party **appropriately qualified person(s)** not previously responsible for any **ASS** management implemented at the Northern Sands site.
- L12.** Land that has been raised through filing as a result of **dredged material** placement or impacted by disturbance as a result of the activities, including any **constructed bund walls**, must be maintained to ensure:
- (a) potential for erosion and remobilisation via flooding is minimised;

- (b) potential for **environmental nuisance** caused by dust is minimised;
- (c) the quality of water released from the site, including seepage, does not cause environmental harm;
- (d) the water quality of any residual water body does not have potential to cause environmental harm;
- (e) the final landform is stable and protects public safety.

#### Stormwater

- S1.** Prior to the commencement of any construction, or **dredged material** placement, **you** must develop and implement erosion and sediment controls for the Tingira Street site in accordance with the Best Practice Erosion and Sediment Control (BPESC) guidelines for Australia (International Erosion Control Association) and maintain sediment control devices to achieve best practice design objectives.
- S2.** Storage areas for hazardous contaminants must be located above the 1% **Annual Exceedance Probability** flood level.
- S3.** For the proposed works **you** must only use materials which are free from contaminants as defined under section 11 of the *Environmental Protection Act 1994*.
- S4.** The facilities supporting the **activity** must include a storage area for hazardous contaminants with secondary containment systems to prevent **any release of contaminants into the environment** from the system, or containers within the system, to land, groundwater, or surface **waters**.

#### Waste

- WS1.** All waste generated in carrying out the **activity** must be reused, recycled or removed to a facility or designated onsite location that can lawfully accept the waste.

#### Noise

- N1.** Noise generated by the activity must not cause environmental nuisance to any sensitive place or commercial place.
- N2.** You must ensure that noise generated by the **activity** does not cause the criteria in **Table N1 – Noise limits** to be exceeded at a **sensitive place** or **commercial place**.

**Table N1 – Noise limits**

Noise level measured in dBA	Monday to Saturday			Sunday and Public Holidays		
	7am – 6pm	6pm – 10pm	10pm – 7am	8am – 6pm	6pm – 10pm	10pm – 8am
	Noise measured at the sensitive place					
LAeq adj, 15min	Bkg + 10dBA	Bkg + 5dBA	Bkg + 5dBA	Bkg + 10dBA	Bkg + 5dBA	Bkg + 5dBA
max LpA, 15min	Bkg + 12 dBA	Bkg + 8 dBA	Bkg + 8dBA	Bkg + 12dBA	Bkg + 8dBA	Bkg + 8dBA
	Noise measured at a commercial place					
LAeq adj, 15min	Bkg + 13dBA	Bkg + 10dBA	Bkg + 10dBA	Bkg + 13dBA	Bkg + 10dBA	Bkg + 10dBA
max LpA, 15min	Bkg + 15dBA	Bkg + 13dBA	Bkg + 13dBA	Bkg + 15dBA	Bkg + 13dBA	Bkg + 13dBA

#### Associated monitoring requirements

- (a) All monitoring must be completed in accordance with the latest version of the administering authority's *Noise Measurement Manual*.
- (b) All noise monitoring devices must be calibrated correctly.

- (c) Any noise monitoring of noise emissions from the activity must be completed when the activity is in operation.
- (d) Monitoring location(s) must be relevant to the matter(s) under investigation.
- (e) Bkg is LA90 (background noise measurement).
- (f) dBA refers to A-weighted decibels.

**N3.** When requested by the **administering authority**, noise monitoring must be undertaken at any **sensitive place** or **commercial place** nominated by the **administering authority**, to determine compliance with noise limits identified in Table N1 Noise limits and results of the monitoring must be submitted to the **administering authority** within 14 days.

**N4.** Noise monitoring must be conducted to determine compliance with noise limits identified in **Table - N1 Noise limits** and must be completed in accordance with the latest version of the **administering authority's Noise Measurement Manual** and must include the following descriptor characteristic and matters:

- (a) LAN,T (where N equals the statistical levels of 1, 10 and 90 and T = 15 mins);
- (b) background noise LA90;
- (c) the level and frequency of occurrence of impulsive or tonal noise and any adjustment and penalties to statistical levels;
- (d) atmospheric conditions including temperature, relative humidity and wind speed and directions;
- (e) effects due to any extraneous factors such as traffic noise;
- (f) location, date and time of monitoring;
- (g) if low frequency noise is present, MaxLpLIN,T and one third octave band measurements in dB(LIN) for centre frequencies in the 10 – 200 hertz range.

**N5.** If monitoring indicates exceedance of the limits in **Table N1 – Noise limits**, then **you** must immediately implement noise abatement measure so that emissions of noise from the **activity** do not result in further **environmental nuisance**.

#### **Air**

**A1.** Other than as permitted within this environmental authority, odours or airborne contaminants must not cause **environmental nuisance** to any **sensitive place** or **commercial place**.

#### **Rehabilitation**

**H1.** An **appropriately qualified person(s)** must design and supervise implementation of a site rehabilitation plan for the **Northern Sands site**.

**H2.** A copy of the site rehabilitation plan must be submitted to the **administering authority** at least 50 business days prior to the commencement of **dredging**, and, if necessary, amended in accordance with comments made by the **administering authority** prior to the commencement of the activity.

**H3.** The site rehabilitation plan must include, but not be limited to:

- (a) scope of works, including a timeframe for these works to be undertaken;
- (b) management **measures** required during decommissioning and removal of the containment structures;
- (c) details of works to be undertaken to ensure;
  - (i) potential for erosion is minimised
  - (ii) potential for **environmental nuisance** caused by dust is minimised;



- (iii) the quality of water released from the site, including seepage, does not cause environmental harm;
  - (iv) the final landform is stable and protects public safety;
  - (v) detailed costings of all works identified for site rehabilitation.
- H4.** You must provide to the administering authority geotechnical certification by a RPEQ certified engineer specialising in geotechnical engineering to verify **dredged material** is stable and suitable for final land use.

#### Structures

- C1.** A minimum freeboard of 600 millimetres must be maintained between the water level in the **Northern Sands DMPA** and the crest level of the **Northern Sands DMPA**.
- Note: The maximum water level in the **Northern Sands DMPA** which preserves the required freeboard allowance below the crest is designated at the **Maximum Operating Level**.*
- C2.** The **Maximum Operating Level** (the **MOL**) must be marked on the **Northern Sands DMPA** in such a way that during routine inspections of the **Northern Sands DMPA**, it is clearly observable.
- C3.** You must, as soon as practicable but within 12 hours of becoming aware, notify the **administering authority** if the level of the water or **dredged material** in the **Northern Sands DMPA** reaches the **MOL**.
- C4.** If for any reason the water level in the **Northern Sands DMPA** rises above the **MOL** you must, immediately cease pumping **dredged material** into the **Northern Sands DMPA** through the **dredged material** delivery pipeline. Pumping must not recommence until the water level in the **Northern Sands DMPA** has fallen below the **MOL**.
- C5.** The water level in the **Northern Sands DMPA** must be recorded on a daily basis.

#### Regulated structures

- X1.** The **consequence category** of any **structure** must be **assessed** by a **suitably qualified and experienced person** in accordance with the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/1933)* at the following times:
- (a) prior to the design and **construction** of the **structure**, if it is not an **existing structure**; or
  - (b) prior to any change in its purpose or the nature of its stored contents.
- X2.** A **consequence assessment** report and **certification** must be prepared for each **structure** assessed and the report may include a **consequence assessment** for more than one structure.
- X3.** **Certification** must be provided by the **suitably qualified and experienced person** who undertook the assessment, in the form set out in the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/1933)*.
- X4.** All **regulated structures** must be designed by, and **constructed**<sup>33</sup> under the supervision of, a **suitably qualified and experienced person** in accordance with the requirements of the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/1933)*.
- X5.** Construction of a regulated structure is prohibited unless:

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<sup>33</sup> **Certification** of design and construction may be undertaken by different persons

- (a) **You** have submitted a **consequence category assessment** report and **certification** to the **administering authority**.
  - (b) **Certification** for the **design, design plan** and the associated operating procedures has been **certified** by a **suitably qualified and experienced person** in compliance with the relevant condition of this environmental authority.
- X6. Certification** must be provided by the **suitably qualified and experienced person** who oversees the preparation of the design plan in the form set out in the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/1933)*, and must be recorded in the **Register of Regulated Structures**.
- X7. Regulated structures** must:
- (a) be designed and **constructed** in compliance with the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/1933)*;
  - (b) be designed and **constructed** with due consideration given to ensuring that the design integrity would not be compromised on account of:
    - (i) floodwaters from entering the **regulated dam** from any **watercourse** or drainage line;
    - (ii) wall failure due to erosion by floodwaters arising from any watercourse or drainage line.
- X8. Certification** by the **suitably qualified and experienced person** who supervises the construction must be submitted to the administering authority on the completion of construction of the regulated structure, and must state that:
- (a) the 'as **constructed**' drawings and specifications meet the original intent of the design plan for that regulated structure
  - (b) construction of the regulated structure is in accordance with the design plan.
- X9. All affected persons** must be provided with a copy of the emergency action plan in place for each regulated structure:
- (a) for existing structures that are regulated structures, within 10 business days of this condition taking effect;
  - (b) prior to the operation of the new regulated structure;
  - (c) if the emergency action plan is amended, within five (5) business days of it being amended.
- X10. Operation of a regulated structure**, except for an existing structure, is prohibited unless **you** have submitted to the **administering authority** in respect of regulated structure, all of the following:
- (a) one paper copy and one electronic copy of the design plan and **certification** of the 'design plan' in accordance with condition X6;
  - (b) a set of 'as constructed' drawings and specifications;
  - (c) **certification** of the 'as constructed drawings and specifications' in accordance with **Condition X6**;
  - (d) where the regulated structure is to be managed as part of an integrated containment system for the purpose of sharing the DSA volume across the system, a copy of the certified system design plan;
  - (e) the requirements of this authority relating to the **construction** of the regulated structure have been met;
  - (f) **you** have entered the details required under this **authority**, into a **Register of Regulated Structures**; and



- (g) there is a current operational plan for the regulated structure.
- X11.** For existing structures that are regulated structures:
- (a) Where the existing structure that is a regulated structure is to be managed as part of an **integrated containment system** for the purpose of sharing the DSA volume across the system, **you** must submit to the administering authority within 12 months of the commencement of this condition a copy of the certified **system design plan** including that structure.
  - (b) There must be a current operational plan for the existing structures.
- X12.** Each **regulated structure** must be maintained and operated, for the duration of its operational life until decommissioned and rehabilitated, in compliance with the current operational plan and, if applicable, the current design plan and associated certified 'as constructed' drawings.
- X13.** By 1 November of each year, storage capacity must be available in the **Northern Sands DMPA** (or network of linked containment systems with a shared **Design Storage Allowance (DSA)** volume, to meet the **DSA** volume for the **Northern Sands DMPA**.
- X14.** **You** must, as soon as practicable but within 48 hours of becoming aware that the regulated dam (or network of linked containment systems) will not have the available storage to meet the **DSA** volume on 1 November of any year, notify the **administering authority**.
- X15.** **You** must, immediately on becoming aware that a regulated dam (or network of linked containment systems) will not have the available storage to meet the **DSA** volume on 1 November of any year, act to prevent the occurrence of any unauthorised discharge from the regulated dam or linked containment systems.
- X16.** Each regulated structure must be inspected each calendar year by a **suitably qualified and experienced person**.
- X17.** At each annual inspection, the condition and adequacy of all components of the **regulated structure** must be assessed and a **suitably qualified and experienced person** must prepare an **annual inspection report** containing details of the assessment and include a recommendations section, with any recommended actions to ensure the integrity of the regulated structure or a positive statement that no recommendations are required.
- X18.** The **suitably qualified and experienced person** who prepared the **annual inspection report** must certify the report in accordance with the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/1933)*.
- X19.** **You** must within 20 business days of receipt of the **annual inspection report**, provide to the **administering authority**:
- (a) the recommendations section of the **annual inspection report**; and
  - (b) actions being taken in response to those recommendations; and
  - (c) if, following receipt of the recommendations and recommended actions, the **administering authority** requests a copy of the **annual inspection report** from **you**, provide this to the **administering authority** within 10 business days of receipt of the request.
- X20.** **You** must provide a copy of any reports, documentation and **certifications** prepared under this authority, including but not limited to any **Register of Regulated Structures**, consequence assessment, design plan and other supporting documentation, to a new holder on transfer of this **authority**.
- X21.** **Regulated structures** must not be abandoned but be either:
- (a) decommissioned and rehabilitated to achieve compliance with **Condition (X22)**; or
  - (b) be left in-situ for a use by the landholder provided that:

- (i) it no longer contains contaminants that will migrate into the environment;
  - (ii) it contains water of a quality that is demonstrated to be suitable for its intended use(s); and
- (c) **you** and the landholder agree in writing that the;
  - (i) dam will be used by the landholder following the cessation of the environmentally relevant activity(ies);
  - (ii) landholder is responsible for the dam, on and from an agreed date.
- X22.** Before surrendering this environmental authority the site must be rehabilitated to achieve a safe, stable, non-polluting landform.
- X23.** A **Register of Regulated Structures** must be established and maintained by **you** for each **regulated structure**.
- X24.** **You** must provisionally enter the required information in the **Register of Regulated Structures** when a design plan for a regulated dam is submitted to the **administering authority**.
- X25.** **You** must make a final entry of the required information in the **Register of Regulated Structures** once compliance with **Condition (X10)** and **(X11)** has been achieved.
- X26.** **You** must ensure that the information contained in the **Register of Regulated Structures** is current and complete on any given day.
- X27.** All entries in the **Register of Regulated Structures** must be approved by the chief executive officer for the **holder** of this authority, or their delegate, as being accurate and correct.
- X28.** **You** must, at the same time as providing the annual return, supply to the **administering authority** a copy of the records contained in the **Register of Regulated Structures**, in the electronic format required by the **administering authority**.
- X29.** The water level in any **regulated structure** must be recorded

#### **Matters of State Environmental Significance**

- MS1.** **Impacts** to a **prescribed environmental matter** are not authorised under this environmental authority or the *Environmental Offsets Act 2014*.
- MS2.** **You** must take all reasonable and practical **measures** to avoid and mitigate impacts on **prescribed environmental matters**.
- MS3.** **Significant residual impacts** on a **prescribed environmental matter** must be offset in accordance with the Environmental Offsets Act 2014, Environmental Offsets Regulation 2014 and the Queensland Government Environmental Offsets Policy.

#### **Definitions**

Note that where a term is not defined, the definition in the *Environmental Protection Act 1994*, its regulations or environmental protection policies must be used. If a word remains undefined, it has its ordinary meaning.

**Acid Sulfate Soils (ASS)** means soils, sediment or other material containing iron sulphides and/or acidity generated by their breakdown.

**Acid neutralising capacity** means a measure of a soils inherent ability to buffer acidity and resist the lowering of the soil pH.

**Activity** means the environmentally relevant **activities** to which the environmental authority relates.

**Administering authority** means the Department of Environment and Science or its successor or predecessors.

**Alert level** represent tiers in a hierarchy of increasing environmental risk and are defined by **trigger values**. Three alert levels (low, moderate, and high) are typically used in a management action framework to indicate adverse conditions and guide management responses that aim to prevent and minimise environmental harm.

**Annual inspection report** means an assessment prepared by a suitably qualified and experienced person containing details of the assessment against the most recent consequence assessment report and design plan (or system design plan);

- (a) against recommendations contained in previous annual inspections reports;
- (b) against recognised dam safety deficiency indicators;
- (c) for changes in circumstances potentially leading to a change in consequence category;
- (d) for conformance with the conditions of this authority;
- (e) for conformance with the 'as constructed' drawings;
- (f) for evidence of conformance with the current operational plan.

**Actual acidity** means soluble and exchangeable acidity readily available for reaction.

**Annual exceedance probability** means the probability that at least one event in excess of a particular magnitude will occur in any given year.

**Appropriately qualified person(s)** means a person or persons who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

**Assessed** or **assessment** by a suitably qualified and experienced person in relation to a consequence assessment of a dam, means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit of the assessment:

- (a) exactly what has been assessed and the precise nature of that determination;
- (b) the relevant legislative, regulatory and technical criteria on which the assessment has been based;
- (c) the relevant data and facts on which the assessment has been based, the source of that material, and the efforts made to obtain all relevant data and facts; and
- (d) the reasoning on which the assessment has been based using the relevant data and facts, and the relevant criteria.

**Associated works** in relation to a dam, means:

- (a) operations of any kind and all things constructed, erected or installed for that dam; and
- (b) any land used for those operations.

**Background noise** means noise, measured in the absence of the noise under investigation, as  $L_{A90, adj, T}$  being the A-weighted sound pressure level exceeded for 90 per cent of the time period of not less than 15 minutes, using Fast response.

**Boundary** means within one metre of the cadastral boundary of the site.

**Bund** means an embankment or earth structure built to prevent the movement of water, liquids or slurries.

**Certification** (in relation to a **Regulated structure**) means assessment and approval must be undertaken by a suitably qualified and experienced person in relation to any assessment or documentation required by the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635)*, including design plans, 'as constructed' drawings and

specifications, construction, operation or an annual report regarding **regulated structures**, undertaken in accordance with the Board of Professional Engineers of Queensland Policy Certification by RPEQs (ID: 1.4 (2A)).

**Closure reporting** means a report submitted to the administering authority that demonstrates that the management of **ASS** has complied with the relevant management guidelines, best practice environmental management and the ASSMP. Closure report must include the mandatory information for extra high level disturbances as outlined in the latest version of the Acid Sulfate Soil Technical Guidelines: Soil Management Guidelines.

**Commercial place** means a place used as a workplace, an office or for business or commercial purposes and includes a place within the curtilage of such a place reasonably used by persons at that place.

**Continuous data logging** means to record instrument-derived data in a memory storage device (a data logger). The frequency of data logging may be, for instance, every 10 minutes, but where a logger device is used *in situ*, the frequency may be dependent on the memory storage capacity of the logger and the time between logger retrieval events. Alternatively, **continuous data logging** may be performed via telemetry, with the data being broadcast to an *ex situ* computer or data logger.

**Construction or constructed** includes building a new structure and modifying an existing structure, but does not include investigations and testing necessary for the purpose of preparing a design plan.

**Dam** means a land-based structure or a **void** that contains, diverts or controls flowable substances, and includes:

- (a) any substances that are thereby contained, diverted or controlled by that land-based structure or **void** and **associated works**.
- (b) all associated works that are connected with ensuring preservation of the integrity of the structure (e.g. spillways and catchment diversions).

**Design storage allowance or DSA** means an available volume, estimated in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635)* published by the administering authority, that must be provided in a dam as at 1 November each year in order to prevent a discharge from that dam to an **annual exceedance probability** specified in that Manual.

**Disturbed areas** include areas:

- (a) that are susceptible to erosion;
- (b) that are contaminated by the **activity**; and/or
- (c) upon which stockpiles of soil or other materials are located.

**Dredged material** means material that has been removed from under surface water, including spoil, other than a mineral within the meaning of any Act relating to mining. Material includes, for example, stone, gravel, sand, rock, clay, mud, silt and soil.

**Dredging** includes extraction of mud, sand, coral, ballast, shingle, gravel, clay, earth and other material from the bed of Queensland tidal and non-tidal **waters**. **Dredging** does not include the banks of a waterway.

**Environmental offset** has the meaning in section 7 of the *Environmental Offsets Act 2014*.

**Environmental nuisance** as defined in Chapter 1 of the *Environmental Protection Act 1994*.

**Environmental value** is:

- (a) a quality or physical characteristic of the environment that is conducive to ecological health or public amenity or safety; or



- (b) another quality of the environment identified and declared to be an **environmental value** under an environmental protection policy or regulation.

**Existing acidity** in acid base accounting for **ASS** is a collective term that includes actual acidity and retained acidity.

**Existing structure** means a structure that prior to the application of regulated structure conditions in this authority has been **constructed** with a design that is in accordance with the Manual for Assessing Consequence Categories and Hydraulic Performance of Structures.

**Financial assurance** is a type of financial security provided to the Queensland Government by the holder of an environmental authority as security for compliance with this environmental authority and any costs or expenses, or likely costs or expenses, mentioned in section 298 of the Act.

**Handover testing** means an independent round of soil sampling and laboratory testing to demonstrate that disturbed **ASS** have been adequately managed in accordance with the latest version of the Acid Sulfate Soil Technical Guidelines: Soil Management Guidelines. It must be undertaken by a **appropriately qualified person(s)** who is an independent third party not previously responsible for any **ASS** management implemented on site.

**Holder** means any person who is the holder of, or is acting under this environmental authority

**Hydraulic performance** means the capacity of a regulated dam to contain or safely pass flowable substances based on the design criteria specified for the relevant consequence category in the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/1933)*.

**In situ sampling** is the measurement of physical and chemical parameters in a water body at the time of sampling

**L<sub>Aeq, adj, T</sub>** means the adjusted A weighted equivalent continuous sound pressure level **measures** on fast response, adjusted for tonality and impulsiveness, during the time period T, where T is measured for a period no less than 15 minutes when the **activity** is causing a steady state noise, and no shorter than one hour when the approved **activity** is causing an intermittent noise.

**Land** means any **land**, whether above or below the ordinary high-water mark at spring tides (i.e. includes **tidal land**).

**Levee** means an embankment that only provides for the containment and diversion of stormwater or flood flows from a contributing catchment, or containment and diversion of flowable materials resulting from releases from other works, during the progress of those stormwater or flood flows or those releases; and does not store any significant volume of **water** or **flowable substances** at any other times.

**Lowest permanent water table** means the lowest level in metres AHD of the water table at the **Northern Sands site** as determined by long-term spatial variation including variations associated with seasons including variations associated with season, climate, topography, vegetation and soil and rock characteristics. Established by an **appropriately qualified person(s)** taking the lowest level of either:

- (a) long term local monitoring data, and/or
- (b) soil profile features of a representative number of intact soil cores, and detailed description of soil lithology.

**m AHD** means metres above Australian Height Datum

**Maximum extent of impact** means the total, cumulative, residual extent and duration of impact to a prescribed environmental matter that will occur over a project's life after all reasonable avoidance and reasonable on-site mitigation measures have been, or will be, undertaken.

**Maximum Operating Level (MOL)** in a regulated dam is the water level which during normal operations which maintains a prescribed minimum freeboard allowance between the water level in the dam and the dam crest level. The freeboard allowance is specified in the conditions of the environmental authority.

**Measures** has the broadest interpretation and includes:

- (a) procedural **measures** such as standard operating procedures for **dredging** operations, environmental risk assessment, management actions, departmental direction and competency expectations under relevant guidelines;
- (b) physical **measures** such as plant, equipment, physical objects (such as bunding, containment systems etc.), ecosystem monitoring and bathymetric surveys.

**Modification or modifying** (see definition of 'construction')

**NATA** means National Association of Testing Authorities.

**New dredging activity** means a **dredging activity** that is currently not underway, the next stage of a **dredging** campaign that is currently underway, or a discretely separate area in a larger dredge campaign that is currently underway. The commencement of **dredging** by a different dredge type than currently operating is also considered a new dredging activity.

**Nominated delegate** means another government agency that provides services to the **administering authority**.

**Northern Sands DMPA** refers to the portion of the **Northern Sands site** that is to be utilised for the purposes of placement of **dredged material** and includes the proposed **bunds** surrounding the placement area as well as a further peripheral area to be utilised for the delivery and tailwater discharge pipe work network.

**Northern Sands site** refers to land covered by Lot 2 on RP712954 and Lot 5 on SP245573 and includes the Northern Sands DMPA.

**Operational plan** includes:

- (a) normal operating procedures and rules (including clear documentation and definition of process inputs in the DSA);
- (b) contingency and emergency action plans including operating procedures designed to avoid and/or minimise environmental impacts including threats to human life resulting from any overtopping or loss of structural integrity of the regulated structure.

**Port facility** means a facility or **land** used in the operation or strategic management of a port authority's port. **Port facility** does not include a small-scale **port facility** to be used for a tourism or recreation purpose. Examples of a small-scale **port facility**—boat ramp, boat harbour, marina.

**Prescribed environmental matter** has the meaning in Section 10 of the *Environmental Offsets Act 2014*

**Register of Regulated Structures** includes:

- (a) Date of entry in the register;
- (b) Name of the structure, its purpose and intended/actual contents;
- (c) The consequence category of the dam as assessed using the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/1933)*;
- (d) Dates, names, and reference for the design plan plus dates, names, and reference numbers of all document(s) lodged as part of a design plan for the dam;
- (e) Name and qualifications of the suitably qualified and experienced person who certified the design plan and 'as constructed' drawings;



- (f) For the regulated dam, other than in relation to any levees –
  - (i) The dimensions (metres) and surface area (hectares) of the dam measured at the footprint of the dam;
  - (ii) Coordinates (latitude and longitude in GDA94) within five metres at any point from the outside of the dam including its storage area
  - (iii) Dam crest volume (megalitres);
  - (iv) Spillway crest level (metres AHD).
  - (v) Maximum operating level (metres AHD);
  - (vi) Storage rating table of stored volume versus level (metres AHD);
  - (vii) Design storage allowance (megalitres) and associated level of the dam (metres AHD);
  - (viii) Dam crest level (metres AHD)
- (g) The design plan title and reference relevant to the dam;
- (h) The date construction was certified as compliant with the design plan;
- (i) The name and details of the suitably qualified and experienced person who certified that the constructed dam was compliant with the design plan;
- (j) Details of the composition and construction of any liner;
- (k) The system for the detection of any leakage through the floor and sides of the dam;
- (l) Dates when the regulated dam underwent an annual inspection for structural and operational adequacy, and to ascertain the available storage volume for 1 November of any year;
- (m) Dates when recommendations and actions arising from the annual inspection were provided to the administering authority;
- (n) Dam water quality as obtained from any monitoring required under this authority as at 1 November of each year.

**Receiving waters** means the **waters** into which this environmental authority authorises tailwater releases from the reclamation area

**Records** include breach notifications, written procedures, analysis results, monitoring reports and monitoring programs required under a condition of this authority.

**Regulated structure** means any structure in the significant or high consequence category as assessed using the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/1933)* published by the administering authority and includes land-based containment structures, levees, bunds and voids.

**Release of a contaminant into the environment** means to:

- (a) deposit, discharge, emit or disturb the contaminant;
- (b) cause or allow the contaminant to be deposited, discharged, emitted or disturbed;
- (c) fail to prevent the contaminant from being deposited, discharged emitted or disturbed;
- (d) allow the contaminant to escape;
- (e) fail to prevent the contaminant from escaping.

**Safety factor** means in acid base accounting, a factor applied to calculate liming rate in order to account for incomplete mixing of neutralising material with soils. A minimum safety factor of 1.5 is applicable to all liming rates in Queensland in accordance with the latest version of the Acid Sulfate Soil Technical Guidelines: Soil Management Guidelines.

**Sensitive place** includes the following and includes a place within the curtilage of such a place reasonably used by persons at that place:

- (a) a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises;
- (b) a motel, hotel or hostel;
- (c) a kindergarten, school, university or other educational institution;
- (d) a medical centre or hospital;
- (e) a protected area under the *Nature Conservation Act 1992*, the *Marine Parks Act 2004* or a World Heritage Area;
- (f) a public park or garden;
- (g) for noise, a place defined as a **sensitive receptor** for the purposes of the Environmental Protection (Noise) Policy 2008.

**Sensitive receptor** includes biological sensitive receptors together with other **environmental values** sensitive to the effects of dredge-generated **sediment plume-associated impacts**.

**Sentinel site** is a **test site** that is situated between the disturbance source and the **sensitive receptor** and serves to provide earlier warning of developing adverse conditions than does a **test site**.

**Significant residual impacts** has the meaning in section 8 *Environmental Offsets Act 2014*.

**Site pairing** refers to monitoring sites that have a functional control-impact relationship, for example, **Control site A** is referenced to assess monitoring data collected from **Concern Sites AA and AB**, thus, **Concern Sites AA and AB** share **site pairing** with **Control Site A**.

**Spillway** means a weir, channel, conduit, tunnel, gate or other structure designed to permit discharges from the dam, normally under flood conditions or in anticipation of flood conditions.

**Structure** means dam or levee

**Suitably qualified and experienced person** in relation to **regulated structures** means a person who is a RPEQ under the provisions of the *Professional Engineers Act 2002*, and has demonstrated competency and relevant experience:

- (a) for regulated dams, an RPEQ who is a civil engineer with the required qualifications in dam safety and dam design
- (b) for regulated levees, an RPEQ who is a civil engineer with the required qualifications in the design of flood protection embankments.

Note: It is permissible that a **suitably qualified and experienced person** obtain subsidiary certification from an RPEQ who has demonstrated competence and relevant experience in either geomechanics, hydraulic design or engineering hydrology.

**System design plan** means a plan that manages an integrated containment system that shares the required DSA and/or ESS volume across the integrated containment system.

**Test site** is a **concern site** that functions as a test point for compliance, is a monitoring site situated within the area where a **sensitive receptor** occurs and where environmental monitoring-related assessment criteria (e.g. **trigger values**) apply.

**Trigger values** are physicochemical, indicator-specific measurement values used to indicate a condition where an **environmental value** or **sensitive receptor** may be at low, moderate or high risk, or some other risk-related indicator.

**Verification testing** means laboratory testing in accordance with the latest version of the Acid Sulfate Soil Technical Guidelines: Soil Management Guidelines to confirm that **ASS** has been properly treated by demonstrating compliance with the established performance criteria, namely that sufficient amount of neutralising agent have been thoroughly mixed with the soils. The

target is to achieve 50% or more neutralising capacity than the sum of existing plus potential acidity (this is the meaning if the 1.5 times safety factor). If a higher safety factor has been specified, then the results of the verification testing must show the corresponding ratio. Verification testing must comprise a full acid base account of the target sample, using appropriate laboratory analysis.

**Void** means any constructed, open excavation in the ground.

**Watercourse** has the meaning in Schedule 4 of the *Environmental Protection Act 1994* and means:

- (a) river, creek or stream in which water flows permanently or intermittently—
  - (i) in a natural channel, whether artificially improved or not; or
  - (ii) in an artificial channel that has changed the course of the **watercourse**.
- (b) **watercourse** includes the bed and banks and any other element of a river, creek or stream confining or containing water.

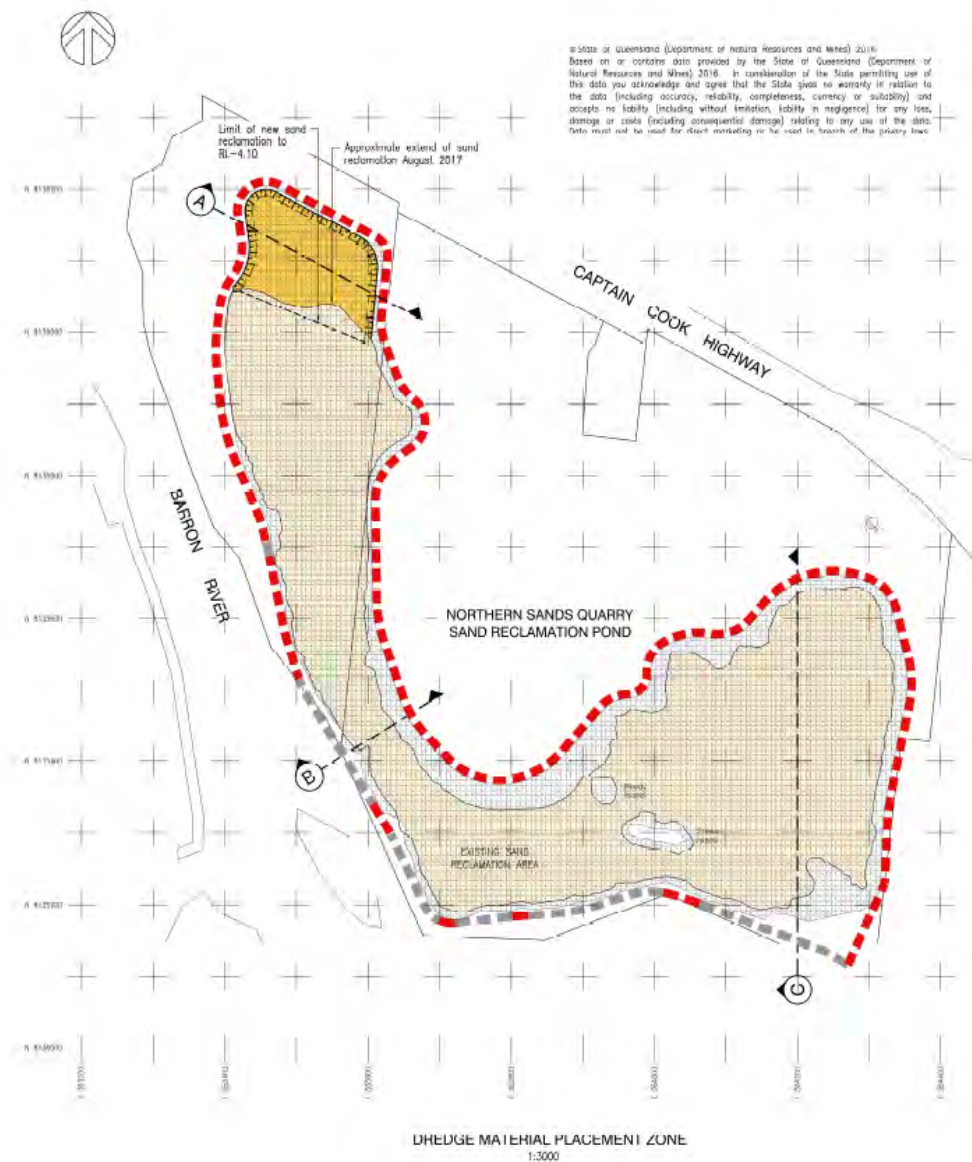
**Waters** includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water, natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater and any part thereof.

**Water table** means the level at which atmospheric and groundwater pressure are equal, below which soil or sediment is water-saturated. May vary with season, climate, topography, vegetation and soil and rock characteristics.

**You** means the holder of the environmental authority.

**Zone of influence** of a sediment plume is, in its broadest application, defined by the **dredge footprint** and the area beyond the **dredge footprint** where at least some level of **sediment plume-associated impacts** are expected to occur. The overall zone of influence may be broken down into more risk-relevant **Zone of impact** sub-categories, such as the *Zone of Unavoidable Loss* (the **dredge footprint** and immediately adjacent areas), the *Zone of Moderate Impact*, or the *Zone of Low Impact*, with each zone being defined according to its purpose or role in environmental management.

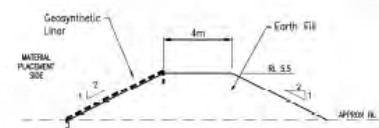
**Zone of impact:** See zone of influence definition.



LEVEL (AHD) (m)	VOLUME BELOW (m³)	COMMENT
5.50	2,861,218	Top of Bund
5.07	2,704,283	Top of Bund at end of placement
5.00	2,678,022	
4.50	2,499,222	
4.07	2,347,000	Top of Material at end of placement
4.00	2,322,488	
3.69	2,214,742	Top of Water at end of 2019
3.50	2,149,522	
3.00	1,980,296	
2.69	1,878,100	Top of Material at end of 2019
2.50	1,813,865	
2.00	1,650,110	
1.50	1,489,590	
1.00	1,332,605	
0.50	1,182,945	
0.00	1,044,381	Lowest Groundwater Level
-0.50	906,260	
-0.59	882,650	Top of Material at end of settlement
-1.00	789,307	
-1.50	637,009	
-2.00	518,746	
-2.50	418,862	
-3.00	340,807	
-3.50	278,403	
-4.00	226,313	
-4.50	190,502	
-5.00	161,571	
-5.50	136,119	
-6.00	113,693	
-6.50	94,419	
-7.00	77,728	
-7.50	64,196	
-8.00	52,556	
-8.50	41,997	
-9.00	32,618	
-9.50	25,109	
-10.00	19,404	
-10.50	14,466	
-11.00	11,156	
-11.50	8,191	
-12.00	5,668	
-12.50	3,849	
-13.00	2,357	
-13.50	1,121	
-14.00	225	
-14.50	0	

- LEGEND**
- EXISTING SAND RECLAMATION AREA (approx 26.2ha)
  - FUTURE SAND RECLAMATION AREA (reforms 7.4ha)
  - DREDGE MATERIAL PLACEMENT ZONE (approx 34.8ha - Surface Area of RL 3.50)
  - EARTH BUND (RL 5.50 - approx 96,000m²)
  - EXISTING EARTH BUND (RL 5.50 or greater)

- NOTES**
- Volumes shown are approximate only and based on a combination of site hydrographic survey and LIDAR survey.
  - For Cross Sections depicting placement of dredged material at weekly intervals, refer D4\_3527-SK15.



Total Bund length approx 4000m.  
Comprising approx 3150m of new bund & 850m of existing surface above RL 5.5

**PERIMETER EARTH BUND**  
NTS

**CONCEPT ONLY**

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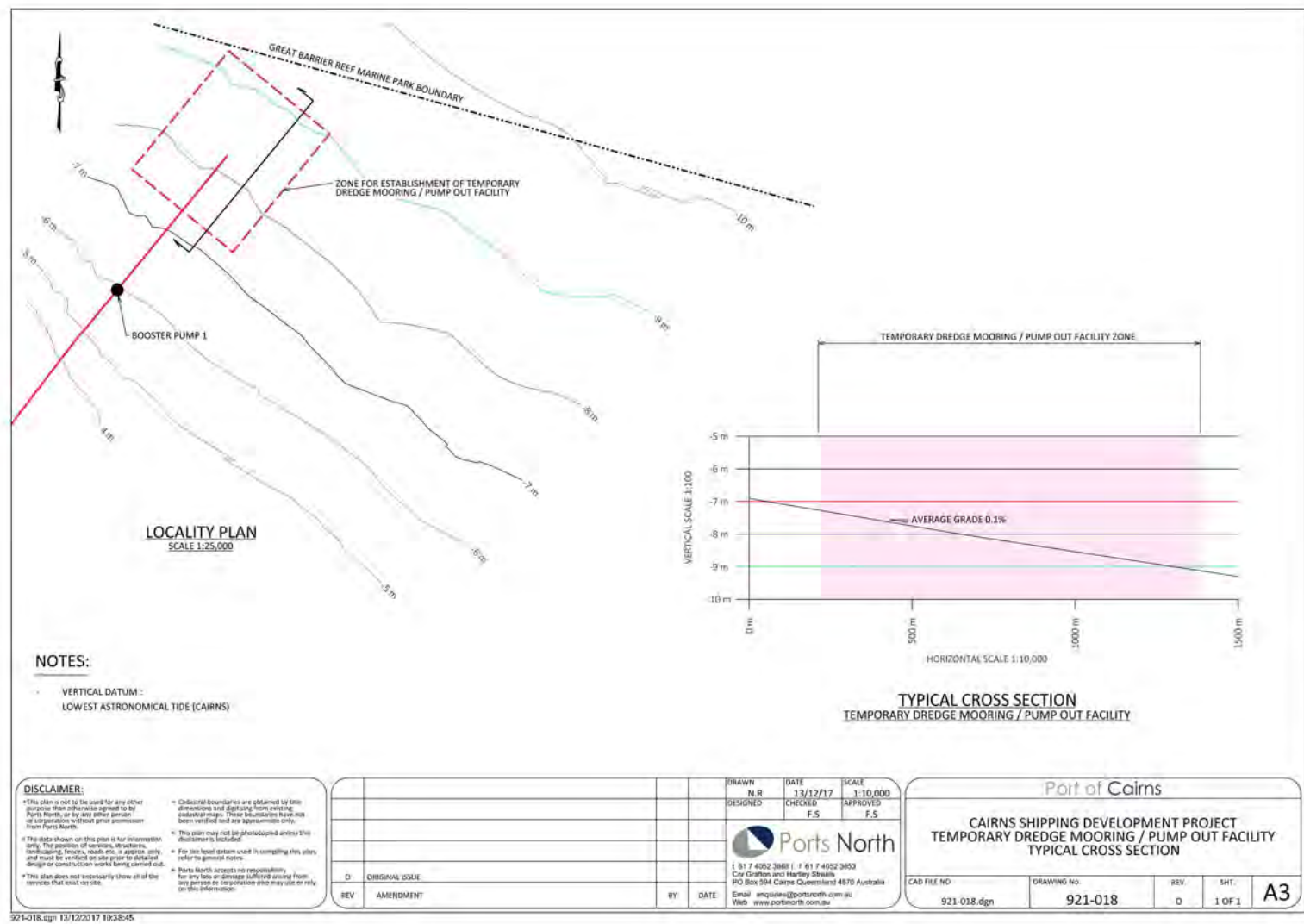
**NORTHERN SANDS**  
Dredge Material Placement  
Placement Zone Plan & Volumes

3527-SK14D

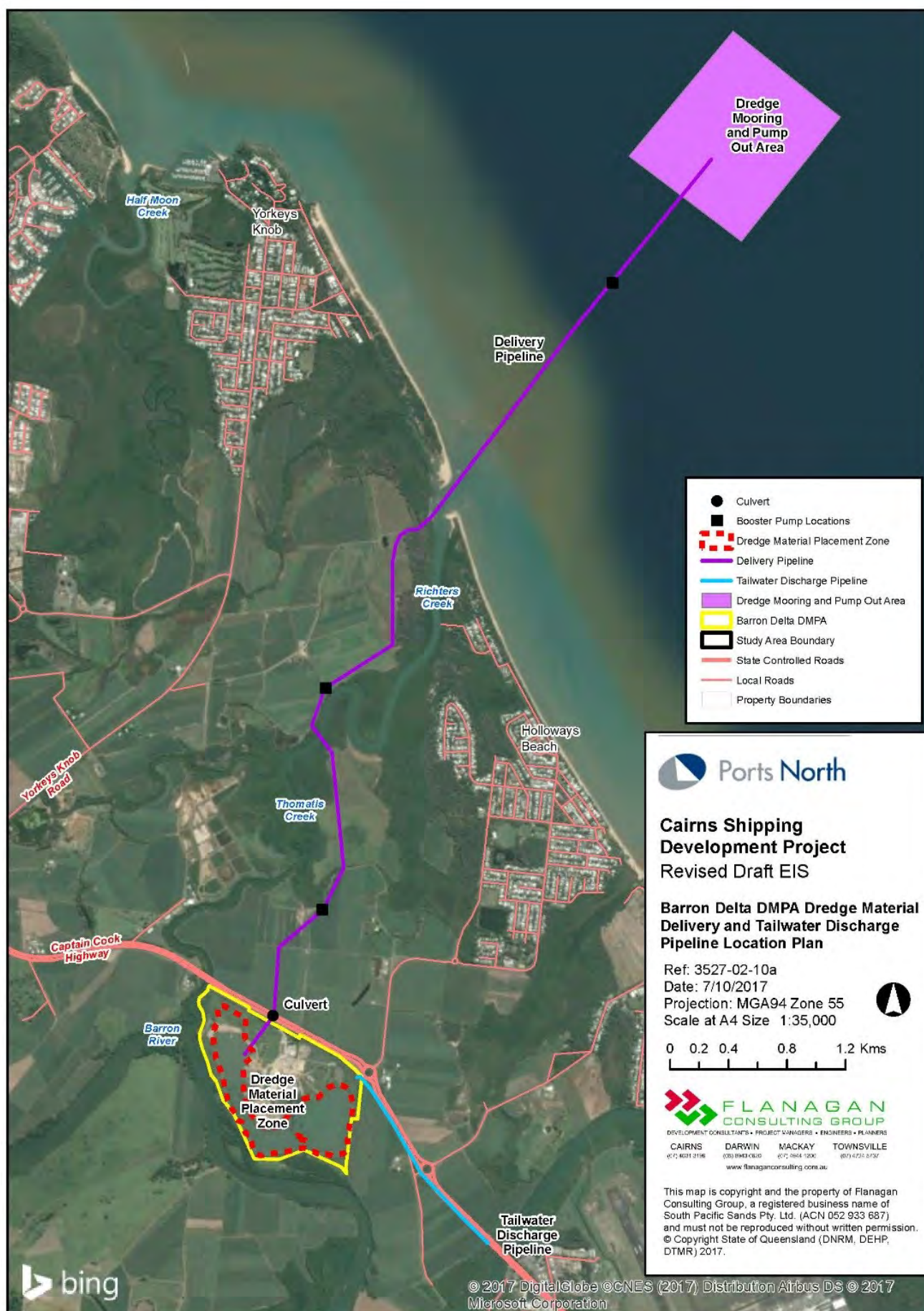
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Asset No.: 3527-SK14D

4 October 2017







## Development permit for Material Change of Use for Dredging and Undefined Use

### Schedule 3. Development permit for Material Change of Use for Dredging (Concurrence ERA 16) and Undefined Use under Cairns Plan 2016

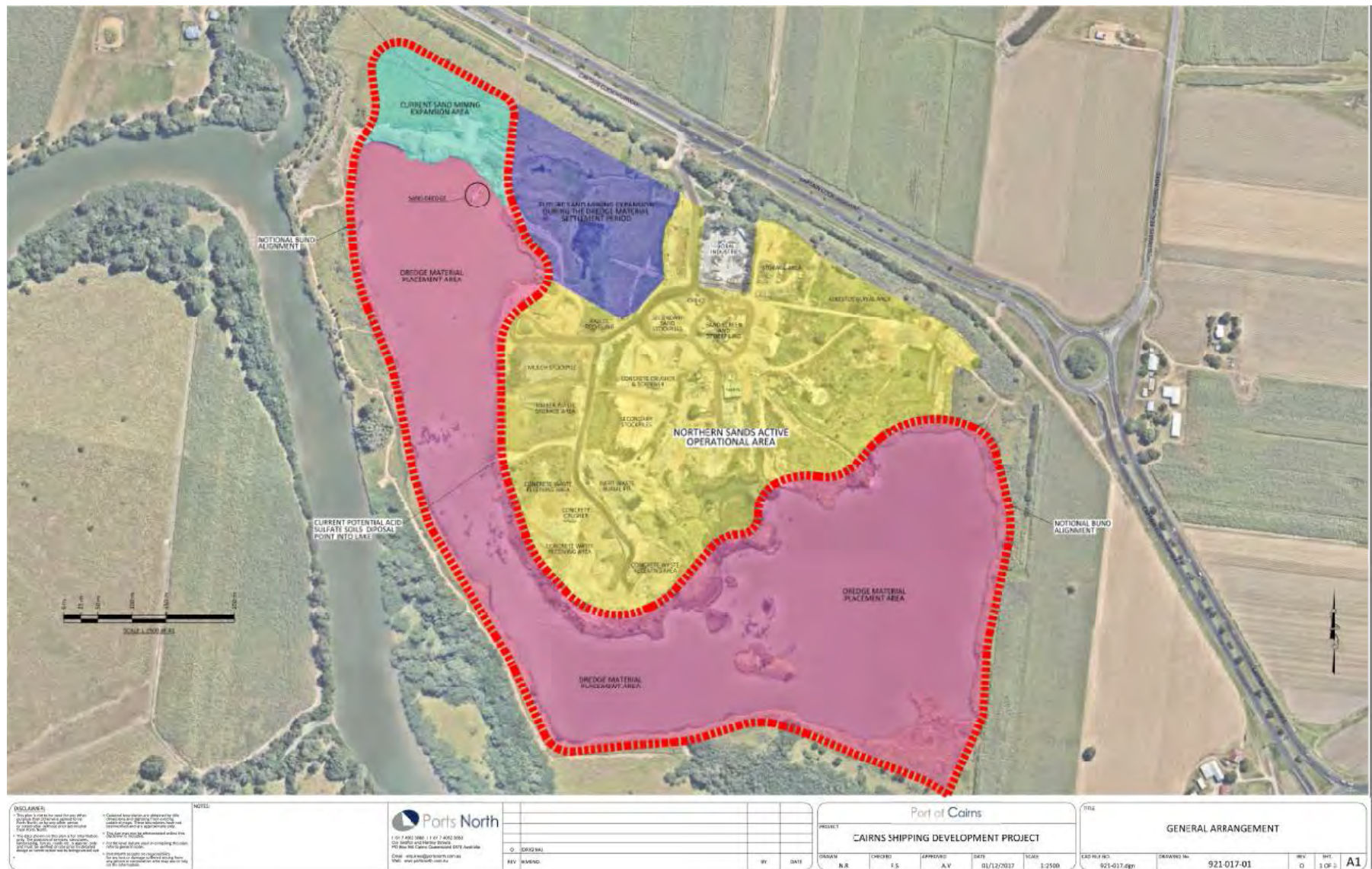
This schedule includes the Coordinator-General's stated conditions for a material change of use under *Planning Act 2016*, stated under section 37 of the *State Development and Public Works Organisation Act 1971*. The entities with jurisdiction for conditions in this schedule are the Cairns Regional Council and the Department of Environment and Science.

This material change of use approval covers the Northern Sands DMPA.

Condition number	Condition ID	Condition
SARA1	SARA model condition V3.0 (AD01)	<p>The development must be carried out generally in accordance with the following plans:</p> <ul style="list-style-type: none"> <li>(a) Placement Zone Plan &amp; Volumes, prepared by Flanagan Consulting Group, dated 04.10.2017, drawing number 3527-SK14D</li> <li>(b) Notional Pipeline Route to Temporary Dredge Mooring/Pump Out Facility, prepared by Ports North, dated 01.12.2017, drawing number 921-017-03 revision 0.</li> <li>(c) Notional bund and pipeline layout, prepared by Ports North, dated 01.12.2017, drawing number 921-017-02.</li> <li>(d) Northern Sands Precinct Plan, prepared by Flanagan Consulting Group, dated 13.12.2017, drawing number 3527-SK 19A.</li> <li>(e) Cairns Shipping Development Project Proposed tailwater discharge pipeline corridor, dated 16.02.2018, drawing number 921-020.</li> </ul> <p><b>Timing: For the duration of works.</b></p>
SARA2	SARA model condition V3.0 (AD02)	<p>The development must be carried out generally in accordance with the Revised EIS prepared by FCG and BMT WBM dated July 2017, in particular:</p> <ul style="list-style-type: none"> <li>• Chapter A3 - Project Description</li> <li>• Chapter C1 - Construction EMP</li> <li>• Chapter C2 - Dredge Management Plan</li> </ul> <p><b>Timing: For the duration of construction works.</b></p>

Condition number	Condition ID	Condition
SARA3	SARA model condition V3.0 (CP08)	<p>1. In the event that the works cause disturbance or oxidation of acid sulfate soil, the affected soil must be tested and treated as necessary, and thereafter managed, in accordance with the latest version of the <i>Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines</i>, prepared by the Department of Science, Information Technology, Innovation and the Arts, 2014 And an acid sulfate soil management plan developed and implemented for the development,</p> <p><b>Timing: At all times.</b></p>
SARA4	SARA Model Condition V3.0 (CP02B – High Risk)	<p>1. An erosion and sediment control plan must be prepared by an <b>appropriately qualified person(s)</b>, in accordance with <i>Best Practice Erosion and Sediment Control (BPESC) guidelines of Australia (International Erosion Control Association)</i> for the <b>Northern Sands DMPA</b>.</p> <p><b>Timing: prior to works occurring.</b></p> <p>2. Provide the erosion and sediment control plan to the palm@ehp.qld.gov.au or mailed to:</p> <p>Department of Environment and Science Permit and License Management Implementation and Support Unit GPO Box 2454 Brisbane QLD 4001</p> <p><b>Timing: prior to works occurring.</b></p> <p>3. Undertake the development generally in accordance with the erosion and sediment control plan.</p> <p><b>Timing: while works are occurring.</b></p> <p>4. Provide written evidence from an <b>appropriately qualified person(s)</b> that all elements of this condition have been complied with.</p> <p><b>Timing: upon completion of the works.</b></p>

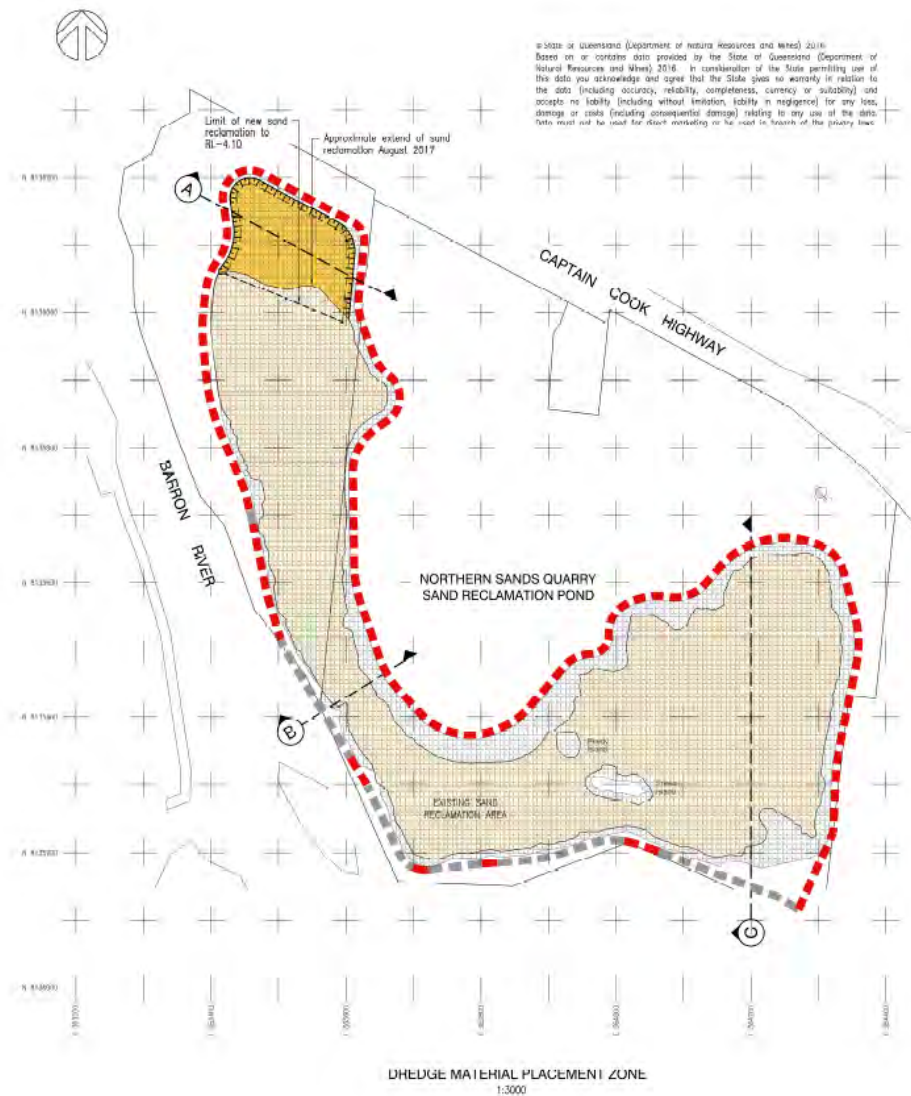












LEVEL (AHD) (m)	VOLUME BELOW (m³)	COMMENT
5.50	2,851,218	Top of Bund
5.07	2,704,781	Top of Material at end of placement
5.00	2,678,022	
4.50	2,499,222	
4.07	2,347,020	Top of Material at end of placement
4.00	2,322,488	
3.69	2,214,742	Top of Water at end of 2019
3.50	2,149,522	
3.00	1,980,296	
2.64	1,878,100	Top of Material at end of 2019
2.50	1,813,865	
2.00	1,650,110	
1.50	1,489,590	
1.00	1,332,806	
0.50	1,182,585	
0.00	1,044,391	Lowest Groundwater Level
-0.50	908,260	
-0.59	882,650	Top of Material at end of settlement
-1.00	769,307	
-1.50	637,009	
-2.00	518,746	
-2.50	418,862	
-3.00	340,807	
-3.50	278,403	
-4.00	226,313	
-4.50	180,502	
-5.00	161,571	
-5.50	136,119	
-6.00	113,693	
-6.50	99,419	
-7.00	77,728	
-7.50	64,196	
-8.00	52,556	
-8.50	41,997	
-9.00	32,618	
-9.50	25,109	
-10.00	19,484	
-10.50	14,686	
-11.00	11,156	
-11.50	8,191	
-12.00	5,669	
-12.50	3,849	
-13.00	2,357	
-13.50	1,121	
-14.00	225	
-14.50	0	

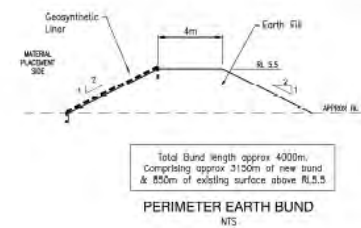
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#### LEGEND

- EXISTING SAND RECLAMATION AREA (approx 26.2ha)
- FUTURE SAND RECLAMATION AREA (approx 7.4ha)
- UNDESIGNATED MATERIAL PLACEMENT ZONE (approx 34.5ha - Surface Area of RL 3.50)
- EARTH BUND (RL 5.50 - approx 95,000m²)
- EXISTING EARTH BUND (RL 5.50 or greater)

#### NOTES

- Volumes shown are approximate only and based on a combination of site hydrographic survey and LIDAR survey.
- For Cross Sections depicting placement of dredged material at weekly intervals, refer D35 3527-SK15.



**CONCEPT ONLY**

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**NORTHERN SANDS**  
Dredge Material Placement  
Placement Zone Plan & Volumes

**3527-SK14D** 1:3000  
A1 Full Size  
Apud No. 3527-SK14D 4 October 2017

Condition number	Condition	Timing						
MCU1	<p>The development must be carried out generally in accordance with the Final EIS and Coordinator General's Evaluation Report for the Cairns Shipping Development Project and the approved plans of development, being:</p> <table border="1"> <tr> <th>Drawing</th><th>Revision number</th><th>Date</th></tr> <tr> <td>TBA</td><td>TBA</td><td>TBA</td></tr> </table>	Drawing	Revision number	Date	TBA	TBA	TBA	At all times
Drawing	Revision number	Date						
TBA	TBA	TBA						
MCU2	This approval provides for a maximum dredged material placement amount of 900,000 cubic metres of soft clay dredged material to be placed within the void of the Northern Sands DMPA as detailed on the approved drawings.	At all times						
MCU3	Dredge material placement at the Northern Sands DMPA may only occur between the months of May to October (inclusive).	At all times						
MCU4	<p>Dredge material placement at the Northern Sands DMPA must not commence until:</p> <ul style="list-style-type: none"> <li>(a) All other necessary prerequisite approvals are obtained;</li> <li>(b) Compliance has been demonstrated with the necessary conditions of any approval and any associated environmental authority or other necessary prerequisite approvals;</li> <li>(c) All other activities within the Northern Sands DMPA, as identified on the approved plans of development, have ceased;</li> <li>(d) A pre-commencement hydrographical survey has been provided to and approved by the Chief Executive Officer of Cairns Regional Council; and</li> <li>(e) A pre-commencement assessment of Acid sulfate soils risk on the placed or otherwise present materials within the Northern Sands DMPA has been provided to and approved by the Chief Executive Officer of Cairns Regional Council.</li> </ul>	As stated within condition						
MCU5	<p>Dredge material placement at the Northern Sands DMPA must cease and must not occur if any other activity commences or recommences within the Northern Sands DMPA.</p> <p>Note: any other activity does not include access.</p>	At all times						
MCU6	All reasonable and practicable measures must be taken to minimise the likelihood of environmental harm being caused.	At all times						
MCU7	The carrying out of the approved use must be done in accordance with all lawful requirements and the conditions of any approval and any associated environmental authority.	At all times						
MCU8	All activities must be undertaken in accordance with the approved Site Based Management Plan.	At all times						
MCU9	Except as otherwise permitted by any associated environmental authority, the release of contaminants into the environment must not occur. If the release of contaminants other than permitted by any approval environmental authority occurs, the activities resulting in	At all times						

	the release of contaminant must cease immediately, and not recommence until the release of contaminant has ceased and any environmental harm has been rectified.	
MCU10	Any breach of a condition of this approval, including a breach of any associated environmental authority, must be reported to the Chief Executive Officer of Cairns Regional Council as soon as practicable but within 24 hours of the applicant/owner becoming aware of the breach. Records must be kept including full details of the breach and any subsequent actions undertaken.	At all times
MCU11	The applicant/owner must advise the Chief Executive Officer of Cairns Regional Council as soon as practicable but within 24 hours of becoming aware of any release of contaminants or environmental harm other than as permitted by the conditions of this approval or any associated environmental authority.  Cairns Regional Council (Phone 1300 692 247)	At all times
MCU12	The placement of dredge material within the Northern Sands DMPA must cease in the following events and must not recommence until the event has been rectified or no longer applies: (a) A failure to meet identified Water quality objectives as required by this approval and/or any associated environmental authority; (b) A failure to meet the required freeboard; (c) A bund failure or if a risk or sign of potential bund failure is identified; (d) An incident occurs which requires reporting under the <i>Environmental Protection Act 1994</i> ; or (e) A disaster is declared under the <i>Disaster Management Act 2003</i> for the district in which the Northern Sands DMPA is located.	At all times
MCU13	Any containment structures or infrastructure required to effect the Northern Sands DMPA, including but not limited to bunds, dams, levees and pipelines (including delivery and discharge pipelines) must be: (a) Designed and certified by a suitably qualified and experienced person; (b) Constructed prior to the commencement of placement of dredged material; (c) Certified by a suitably qualified and experienced person as being constructed in accordance with the certified design; (d) Maintained at all times to the certified design; and (e) Removed within 3 years of the completion of construction.	As stated within condition
MCU14	Prior to the commencement of works, the proponent must provide copies of RPEQ certified plans prepared by a suitably qualified and experienced person, providing details of the landform and infrastructure for the stages of the project: (a) Any temporary infrastructure required during the construction of the delivery pipeline, bund, and discharge pipeline; (b) Infrastructure required during the dredging phase, including: a. The Delivery Pipeline and associated works,	As stated within condition

	<ul style="list-style-type: none"> <li>b. The Dredge Material Containment Bund and associated works,</li> <li>c. The Tailwater Discharge Pipeline and associated works;</li> <li>(c) Infrastructure required during the initial settlement phase, after dredging is complete but before the bund is removed;</li> <li>(d) Infrastructure required during the later settlement phase, after the bund is removed but before settlement is complete;</li> <li>(e) The planned rehabilitated landform, after completion of the project.</li> </ul>	
MCU15	<p>Prior to the commencement of works, submit to the Chief Executive Officer of Cairns Regional Council RPEQ certified plans prepared by a suitably qualified and experienced person for the following infrastructure:</p> <ul style="list-style-type: none"> <li>(a) Containment of dredged material;</li> <li>(b) Planned final settlement of dredged material;</li> <li>(c) Discharge of tail waters (saline or otherwise);</li> <li>(d) Any other built infrastructure on-site and associated with or required by this approval or any associated environmental authority.</li> </ul>	Prior to commencement of works
MCU16	Within two weeks of the completion of construction of infrastructure, as-constructed drawings of all infrastructure must be submitted to the Chief Executive Officer of Cairns Regional Council.	At all times
MCU17	All infrastructure must be maintained to the certified design until the completion of the project or the infrastructure is to be decommissioned in accordance with the Site Based Management Plan.	At all times
MCU18	The proponent must provide written notice to the Chief Executive Officer of Cairns Regional Council of the date when dredging will commence at least ten (10) business days prior to starting the dredging activity.	As specified within condition
MCU19	A copy of this approval and any associated environmental authority and any plans or documents specified within the conditions of this approval and any associated environmental authority must be kept in a location readily accessible to personnel carrying out the activity.	At all times
MCU20	All relevant personnel operating under this approval and any associated environmental authority must be trained in the relevant operator instructions / emergency procedure guides including the use of any spill kit/s.	At all times
MCU21	The bunds surrounding the void within the Northern Sands DMPA must be decommissioned prior to the cessation of the project. The decommissioning of the bunds surrounding the Northern Sands DMPA must be undertaken in accordance with the approved Site Based Management Plan.	As specified within condition
MCU22	<p>The development shall have a no-worsening impact on flooding and groundwater quality for external properties, unless the impacted land owner(s) provide their consent to impacts. Any such consent, where provided, must detail the extent of the accepted impact.</p> <p>Note: up to and including 20mm of increased inundation associated with impacts on flooding is considered to be 'no-worsening'.</p>	At all times

MCU23	<p>To ensure that all PASS materials will settle to, and remain below -1m below the lowest permanent watertable at the cessation of the project, the final target (post-settlement) bulk density of the placed material measured in accordance with Australian Standard 1141-2009, is to be nominated to the satisfaction of the Chief Executive Officer of Cairns Regional Council by written notification at least ten (10) business days before the dredging activity commences. The nominated bulk density must be sufficient to ensure no material PASS displacement if further filling occurs on top of the placed dredged material.</p> <p>Accordingly, the project will not be deemed to have ceased and no other activities will occur on the site until:</p> <ul style="list-style-type: none"> <li>(a) The PASS material has been certified to have settled - 1m below the lowest permanent watertable;</li> <li>(b) The dredge material has been certified to have settled to a level where remobilisation of the material is judged unlikely to occur; and</li> <li>(c) at least 85% of the insitu materials are certified to have achieved the final target, (post-settlement) bulk density, measured in accordance with Australian Standard 1141-2009.</li> </ul>	As specified within condition
MCU24	All plans and documents specified within the conditions are required to be prepared by a suitably qualified and experienced person to the satisfaction of the Chief Executive Officer of Cairns Regional Council and in accordance with best practice principles and guidelines, relevant statutory documents and any requirements specified within the conditions of this approval.	At all times
MCU25	Plans and documents specified within the conditions of this approval must not be amended except in accordance with this approval.	At all times
MCU26	All plans and documents specified within the conditions of this approval must be implemented in accordance with the relevant plan or document and under the supervision of a suitably qualified and experienced person.	At all times
<b>Site Based Management Plan (SBMP)</b>		
SBMP1	<p>Prepare a Site Based Management Plan (SBMP) for the management of all activities authorised under this approval and any associated environmental authority. The SBMP must identify all sources of potential or actual environmental harm, including but not limited to the actual and potential release of all contaminants, the potential impact of these sources, each environmental receptor that could be impacted; and what actions will be taken to prevent the likelihood of environmental harm being caused. The SBMP must provide for at least the following functions:</p> <ul style="list-style-type: none"> <li>(a) Identify all sources of potential or actual environmental harm, including but not limited to actual and potential releases of contaminants;</li> <li>(b) Identify the likelihood of potential or actual environmental harm occurring from these sources;</li> <li>(c) Identify the potential impacts of these sources;</li> <li>(d) Map, at an appropriate scale, each environmental receptor including, but not limited to, receptors such as landholders, vegetation, wetland and ecosystem</li> </ul>	Prior to commencement of works



	<p>features, agricultural lands and uses, receiving waters (both ground and surface) in the receiving environment;</p> <p>(e) Identify potential environmental impacts that may result from the activities on each identified receptor;</p> <p>(f) Identify control measures that minimise the potential for environmental harm;</p> <p>(g) Record relevant organisational structures, accountabilities and responsibilities;</p> <p>(h) Detail contingency plans that are in place and for key identified uncertainties, including but not limited to dredge material bulking in excess of predicted rates;</p> <p>(i) Detail corrective actions, mitigation measures and ameliorants;</p> <p>(j) Detail emergency plans and procedures;</p> <p>(k) Document the arrangements for effective communication;</p> <p>(l) Document the arrangements for monitoring of all contaminant releases, including those authorised under this approval and any environmental authority;</p> <p>(m) Document appropriate record keeping procedures;</p> <p>(n) Detail periodical reviews of environmental performance and implementation of continual improvements;</p> <p>(o) Detail closure reporting requirements.</p> <p>The SBMP is required to be prepared with reference to the following documents and/or plans as specified by the conditions of this approval and any associated environmental authority:</p> <ul style="list-style-type: none"> <li>a. Hydrographic and site survey requirements;</li> <li>b. Groundwater assessment;</li> <li>c. Surface water assessment;</li> <li>d. Site water and material balance assessment;</li> <li>e. Flood modelling;</li> <li>f. Consequence category assessment;</li> <li>g. Acid sulfate soils management plan;</li> <li>h. Dredge management plan;</li> <li>i. Receiving environment monitoring program;</li> <li>j. Stormwater management and erosion and sediment control plan;</li> <li>k. Rehabilitation / final land form plan;</li> <li>l. Emergency management plan;</li> <li>m. Any other requirements specified elsewhere within the conditions of this approval and any associated environmental authority.</li> </ul>	
SBMP2	The SBMP must be prepared by a suitably qualified and experienced person and must be prepared to the satisfaction of the Chief Executive Officer of Cairns Regional Council.	Prior to commencement of works
SBMP3	The SBMP must be submitted for approval by Cairns Regional Council a minimum of twenty (20) business days prior to any planned commencement of activities authorised under this approval or any associated environmental authority.	As specified within condition
SBMP4	At all times, activities authorised under this approval must be undertaken in accordance with the approved SBMP.	At all times
SBMP5	A suitably qualified and experienced person must be responsible for the implementation of the provisions within the SBMP.	At all times

SBMP6	Any amendments to the SBMP must be authorised by the Chief Executive Officer of Cairns Regional Council, and an updated copy of the SBMP must be provided to Cairns Regional Council within five (5) days of the amendment being authorised.	As specified within condition
<b>Survey requirements</b>		
SURV1	<p>Prior to the commencement of placement of dredge material a hydrographic survey of the void within the Northern Sands DMPA must be prepared by a suitably certified and registered surveyor.</p> <p>If additional material is placed within the void within the bunded area that is not associated with the activities approved within this approval or any associated environment authority, an additional hydrographic survey must be undertaken.</p>	As specified within condition
SURV2	A copy of the hydrographic survey is required to be provided to Cairns Regional Council at least ten (10) business days prior to the commencement of dredge material placement.	As specified within condition
SURV3	Prior to the commencement of works a detailed site survey of the Northern Sands DMPA is to identify all existing structures, levels and contours at a minimum 0.5m interval, all existing vegetation and all existing infrastructure and services. The survey is to be prepared by a suitably certified and registered surveyor.	As specified within condition
SURV4	A copy of the detailed site survey is required to be provided to Cairns Regional Council at least ten (10) business days prior to the commencement of dredge material placement.	As specified within condition
<b>Site Water and Material Balance Assessment (SWMBA)</b>		
SWMBA1	A Site Water and Material Balance Assessment (SWMBA) must be developed and documented to the satisfaction of the Chief Executive Officer of Cairns Regional Council. The assessment must be conducted in accordance with contemporary practice considering guidance in relevant standards and guidelines including the "Manual for Assessing Consequence Categories and Hydraulic Performance of Structures". Sufficient information must be provided in the report to demonstrate that the project meets the required objectives and to enable independent review of the data, methodology and results of the SWMBA Study.	Prior to activity commencement
SWMBA2	The SWMBA must be carried out by a suitably qualified and experienced RPEQ. The RPEQ must certify that the SWBMA report demonstrates that the project meets the overall objective of reducing environmental harm to as low a level as reasonably possible as well as the conditions of this approval or any associated environmental authority.	At all times
SWMBA3	The SWMBA must be presented in a single report or set of reports consistent with the works and activities authorised by this approval and any associated environmental authority.	As specified within condition
SWMBA4	<p>The SWMBA Report must contain:</p> <p>(a) Clearly stated aims and objectives</p> <p>(b) Description of the proposed storage and release infrastructure. A Level- Area-Volume relationship for the storage, and Level-Discharge Capacity</p>	At all times

	<p>relationships for the Spillway and all outlets, must be provided;</p> <p>(c) Description of the water and material management rules proposed to be applied and their dependency on inflow (both water and material), storage water quality, bulking factor, tailwater quality, storage level, etc. Reference must be made to the water quality objectives defined by the conditions of this approval and any associated environmental authority.</p> <p>(d) A failure to contain – overtopping consequence category assessment, carried out and certified by a suitably qualified and experienced RPEQ in accordance with Queensland Government “Manual for Assessing Consequence Categories and Hydraulic Performance of Structures”.</p> <p>a. Regardless of the assessed failure to contain – overtopping consequence category, the uncontrolled release of poor quality water over the spillway owing to accumulated seasonal rain or an extreme storm must be limited by setting an appropriate wet season containment volume and storm event containment depth.</p> <p>(e) Details of the modelling of the placed dredge material volume and void water quantity and qualities. This assessment must be prepared based on the following conditions:</p> <p>a. A continuous simulation approach must be applied from the commencement of dredge material placement to the completion of dredge material settlement;</p> <p>b. The assessment must include modelling of: the void capacity, the reduction of the bund level over time, the incoming pumped dredged material, predicted settlement of the dredge material, estimated seepage and evaporation, the interaction of incoming salt water with the pre-existing water in the void, the water quality objectives defined by the conditions of this approval and any associated environmental authority, and the release of supernatant under a set of operational rules that meet the required water quality objectives.</p> <p>c. A range of historical rainfall sequences must be applied in order to provide a probabilistic appreciation of the likelihood of the DSA, ESS and water quality objectives being exceeded over the simulation period.</p> <p>d. The maximum time step for the model is daily;</p> <p>e. Results presented to support this assessment must include probabilistic time series plots and exceedance plots of the storage volume, level,</p>	
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	<p>settling rates and quality and the receiving water qualities.</p> <p>f. The results of the continuous simulation model must demonstrate that the defined spillway crest level provides the required wet season containment performance.</p> <p>(f) Consideration must be given to the potential impact of uncertainties including dredging delays, maintenance shutdowns, etc.</p> <p>(g) Sensitivity analysis of key model input parameters, including bulking factor and settlement rate;</p> <p>(h) The results of the assessment must be interpreted by a suitably qualified and experienced RPEQ including comment on key limitations of the assessment and the project's ability to meet the requirements of relevant permits and conditions related to the proposed works;</p> <p>(i) A clear description of the recommended site operation rules and actions resulting from this assessment must be included in the Report.</p> <p>As part of the annual reporting of the project, the discharges made under the provisions of this approval and any associated environmental authority are to be reconciled with the water quality objectives and settlement objectives stated in this approval and any associated environmental authority and certified by an suitably qualified and experienced RPEQ that the SBMP has been complied with.</p>	
SWMBA5	If the proposed works/activities are further updated after the completion of the SWMBA, an assessment of the likelihood of the changes affecting the results of the SWMBA must be undertaken by a suitably qualified and experienced RPEQ, and if significant changes are possible then the SWMBA Study must be updated to be consistent with the latest details of the proposed works/activity and the appropriate changes made to the SWMBA and subordinate site operation plans.	As specified within condition
SWMBA6	A copy of the approved SWMBA must be submitted to Cairns Regional Council at least fifty (50) business days prior to the commencement of works.	As specified within condition
SWMBA7	A suitably qualified and experienced person must be responsible for the implementation of the SWMBA.	At all times
SWMBA8	The SWMBA shall be implemented until completion of the project to ensure no ongoing impacts or risk to the receiving environment from the activity authorised by this approval and any associated environmental authority.	As specified within condition
SWMBA9	Any amendments to the SWMBA must be authorised Cairns Regional Council, and an updated copy of the SWMBA must be provided to Cairns Regional Council within five (5) business days of the amendment being authorised.	As specified within condition
<b>Stormwater management and erosion and sediment control plan (SWMESCP)</b>		
SWMESCP1	Prepare a combined site Stormwater management plan and erosion and sediment control plan (SWMESCP). The SWMESCP must be prepared to the satisfaction of the	Prior to activity commencement

	<p>Chief Executive Officer of Cairns Regional Council, by a suitably qualified and experienced RPEQ and in accordance with appropriate guidelines such as the current version of <i>Best Practice Erosion and Sediment Control Guidelines for Australia (IECA)</i>.</p> <p>The SWMESCP must cover all phases at the Northern Sands DMPA, from the construction phase to final settlement and must include any necessary references to other activities occurring at the Northern Sands site. The SWMESCP must also cover the land along the alignments of the delivery and discharge pipelines. The SWMESCP must include sufficient detail to address requirements (a) – (o) of Condition SBMP1 and provide for:</p> <ul style="list-style-type: none"> <li>(a) The installation and maintenance of suitable banks and/or diversion drains on site to exclude uncontaminated stormwater runoff entering the Northern Sands DMPA and other operational areas on the Northern Sands site;</li> <li>(b) Stormwater runoff from disturbed areas associated with the Northern Sands DMPA, generated by (up to and including) a 24 hour storm event with an average recurrence interval of 1 in 10 years must be retained on site or managed to remove contaminants before release;</li> <li>(c) The storage of hazardous materials and goods must be located above the 1% AEP flood event.</li> </ul> <p>The SWMESCP is required to detail:</p> <ul style="list-style-type: none"> <li>(a) Monitoring requirements;</li> <li>(b) Auditing requirements;</li> <li>(c) Reporting and record keeping requirements;</li> </ul>	
SWMESCP2	A copy of the approved SWMESCP must be submitted to Cairns Regional Council at least fifty (50) business days prior to the commencement of activities.	Prior to the commencement of activities
SWMESCP3	A suitably qualified and experienced person must be responsible for the implementation of the SWMESCP.	At all times
SWMESCP4	The SWMESCP shall be implemented until completion of the project to ensure no ongoing impacts or risks to the receiving environment from the activity authorised by this approval and any associated environmental authority.	As specified within condition
SWMESCP5	Any amendments to the SWMESCP must be authorised by the Chief Executive Officer of Cairns Regional Council, and an updated copy of the SWMESCP must be provided to Cairns Regional Council within five (5) business days of the amendment being authorised.	As specified within condition
<b>Emergency management plan (EMP)</b>		
EMP1	Prepare an Emergency management plan to provide procedures and guidance for site staff in a range of potential emergencies, including but not limited to extreme weather, structural failure or contaminant discharge. The EMP must be prepared to the satisfaction of the Chief Executive Officer of Cairns Regional Council, by a suitably	Prior to the commencement of activities



	<p>qualified and experienced person. The EMP must include sufficient detail to address requirements (a) – (o) of Condition SBMP1.</p> <p>The EMP is required to detail:</p> <ul style="list-style-type: none"> <li>(a) Monitoring requirements;</li> <li>(b) Auditing requirements;</li> <li>(c) Reporting and record keeping requirements.</li> </ul>	
EMP2	A copy of the approved EMP must be submitted to Cairns Regional Council at least fifty (50) business days prior to the commencement of activities.	Prior to the commencement of activities
EMP3	A suitably qualified and experienced person must be responsible for the implementation of the EMP.	At all times
EMP4	The EMP shall be implemented until completion of the project to ensure no ongoing impacts or risks to the receiving environment from the activity authorised by this approval and any associated environmental authority.	As specified within condition
EMP5	Any amendments to the EMP must be authorised by the Chief Executive Officer of Cairns Regional Council, and an updated copy of the EMP must be provided to Cairns Regional Council within five (5) business days of the amendment being authorised.	As specified within condition
<b>Rehabilitation / final landform plan (RFLP)</b>		
RFLP1	<p>Prepare a Rehabilitation / final landform plan (RFLP). The RFLP must be prepared to the satisfaction of the Chief Executive Officer of Cairns Regional Council, by a suitably qualified and experienced person and in accordance with the requirements of the FNQROC Design Guideline and Specification for Natural Area Restoration and any other plan prepared for this approval or any associated environmental authority and any appropriate guideline. The RFLP must include sufficient detail to address requirements (a) – (o) for Condition SBMP1. The RFLP must provide for:</p> <ul style="list-style-type: none"> <li>(a) Where practicable the progressive rehabilitation of the site;</li> <li>(b) The minimisation of erosion potential;</li> <li>(c) The minimisation for potential environmental nuisance (dust, noise);</li> <li>(d) A placed material bulk density sufficient to ensure no material PASS displacement if further filling occurs on the top of the placed dredged material;</li> <li>(e) The final landform to be stable and protect public safety.</li> </ul>	Prior to the commencement of activities
RFLP2	The rehabilitated landform of the site at the completion of the project must be consistent with that used in the flood assessment (conditions FA1-FA16).	Prior to the commencement of activities
RFLP3	A copy of the approved RFLP must be submitted to Cairns Regional Council at least fifty (50) business days prior to the commencement of activities.	Prior to the commencement of activities

RFLP4	A suitably qualified and experienced person must be responsible for the implementation of the RFLP.	At all times
RFLP5	The RFLP shall be implemented at the completion of the project to ensure no ongoing impacts or risks to the receiving environment from the activity authorised by this approval or any associated environmental authority.	As specified within condition
RFLP6	Any amendments to the RFLP must be authorised in writing by the Chief Executive Officer of Cairns Regional Council, and an updated copy of the RFLP must be provided to Cairns Regional Council within five (5) business days of the amendment being authorised.	As specified within condition
<b>Rehabilitation</b>		
SREH1	<p>The Northern Sands DMPA must be rehabilitated in accordance with the RFLP. The rehabilitation processes on the site must be completed as soon as practicable and prior to the onset of the following wet season. The rehabilitation of the site must achieve a safe, stable, non-polluting landform.</p> <p>Note: the Queensland wet season is considered to be from 1 November one year to 30 April the following year, inclusive.</p>	At all times and prior to the surrender of this approval or any associated environmental authority.
<b>Flood risk Assessment</b>		
FA1	A Flood Risk Assessment (FRA) of the proposed works must be developed and documented to the satisfaction of the Chief Executive Officer of Cairns Regional Council. The assessment must be conducted in accordance with contemporary practice considering guidance in relevant standards and guidelines, including the CairnsPlan 2016 Planning Scheme, Australian Rainfall and Runoff, and the FNQROC Regional Development Manual. Sufficient information must be provided in the report to demonstrate that the project meets the required objectives and to enable independent review of the data, methodology and results of the Flood assessment.	Prior to activity commencement
FA2	The FRA must be carried out by a suitably qualified and experienced RPEQ. The RPEQ must certify that the FRA demonstrates that the project meets the overall objective of reducing environmental harm to as low a level as reasonably possible as well as the conditions of this approval and any associated environmental authority.	At all times
FA3	The FRA must be presented in a single report or set of reports consistent with the works and activities authorised by this approval and any associated environmental authority.	At all times
FA4	<p>The FRA Report must contain:</p> <p>(a) Clearly stated aims and objectives</p>	At all times

	<ul style="list-style-type: none"> <li>(b) Description of the activity on the Northern Sands Site with a focus on those aspects with the potential to impact on flooding.</li> <li>(c) A detailed description of the development of the flood model used as the basis for the assessment.</li> <li>(d) An assessment of the potential for the activity to increase property damage in floods.</li> <li>(e) An assessment of the potential of the activity to increase the flood hazard for the community.</li> <li>(f) An assessment of the hazard associated with the potential structural failure of the bund.</li> <li>(g) An assessment of the impact of the activity on the potential for erosion.</li> <li>(h) An assessment of the potential resuspension risk of the placed dredge material in floods.</li> <li>(i) A Severe Storm Impact Statement;</li> <li>(j) A Sensitivity Analysis;</li> <li>(k) The minimum required content as detailed in Conditions FA5 – FA15 inclusive.</li> </ul>	
FA5	<p>The description of the activity on the Northern Sands Site, referred to in Condition FA4 (b), must at a minimum contain a description of:</p> <ul style="list-style-type: none"> <li>(a) The quantity of dredge spoil material to be placed;</li> <li>(b) The placement methodology. In addition to the standard methodology, contingency action for a range of possible complications (such as wet weather, slow settlement or poor water quality) and their potential impact on key factors (such as the size of the bund or the timing of the project stages) must be described.</li> <li>(c) The size and arrangement of the void and surrounding bund where the material will be placed. Includes, but not limited to: <ul style="list-style-type: none"> <li>a. A standard bund cross-section and a map of its location in relation to key nearby features including the river, creek, highway, highway bridges and culverts, etc</li> <li>b. The crest elevation of the bund along its full length</li> <li>c. The location, size and lining of any spillways</li> <li>d. The location and size of any balancing pipes</li> <li>e. Details of any erosion protection measures</li> </ul> </li> <li>(d) The activities, infrastructure and timing of each of the key stages of the project in relation to the site's potential for impact on flooding including the following key stages: <ul style="list-style-type: none"> <li>a. Existing / Pre-project Stage, representing the extent of currently approved infrastructure and activities on the site before the activities covered by this approval and any associated environmental authority commence. Includes landform and infrastructure associated with the current Quarry and Waste Disposal use of the site including the extent of existing approved levees. The defined</li> </ul> </li> </ul>	At all times

	<p>case/s developed for this stage provide the base case/s for the assessment of the proposed activity.</p> <ul style="list-style-type: none"> <li>b. Construction – Placement – Pipeline Deconstruction Stage, representing the site during the construction of the delivery pipeline, bund, and discharge pipeline and other works, the placement of the dredge material, and the deconstruction of the delivery pipeline. Existing approved quarry/waste disposal infrastructure or activities that are proposed to be permanently or temporarily altered during this and later stages, for example waste disposal into the void, must be made clear.</li> <li>c. First Wet Season Post-Placement Stage, representing conditions at the start of the first wet season after the commencement of the project.</li> <li>d. First Wet Season Post-Bund Removal Stage, representing conditions at the start of the first wet season after the bunds are reduced in level. The extent of any levee/bund retained for ongoing site operations, if any, must be made clear.</li> <li>e. Handover Stage, representing conditions after the dredge material has fully settled and the site is handed back to the quarry and waste disposal operator. If elements of the bund, pipelines or other infrastructure with the capacity to influence flooding will be remain after handover, this must be clearly specified.</li> <li>f. Final Landform Stage, representing conditions after the completion of all approved activities on the site including quarry, waste disposal and dredge material placement.</li> </ul> <p>Note: assessment of this state is only required if the activities within this approval or any associated environmental authority alter the currently approved final landform conditions for the Northern Sands site.</p> <p>In circumstances where there is reasonable uncertainty related to the extent of the required infrastructure or the duration of a stage, or where there is a requirement for flexibility to allow the project to address issues as they arise, the description of each stage must provide an outline of the key uncertainties involved or freedoms required. For the purposes of the flood assessment, an envelope approach may be applied to allow a conservative appreciation of the potential for environmental harm from the proposed project.</p>	
FA6	The description of the development of the flood model used as the basis for the assessment of the proposed development, referred to in of Condition FA4 (c), must contain a description of the modelling data, assumptions,	At all times

	<p>methodology and results, to a sufficient standard to allow independent review. At a minimum the report must describe the following :</p> <ul style="list-style-type: none"> <li>(a) the development of the boundary conditions applied to the model, including inflow hydrographs and tidal boundaries for the various AEP design floods modelled. Graphs of the boundary conditions must be provided. If previously derived inflow hydrographs are not updated using the latest Australian Rainfall and Runoff procedures, an assessment of the potential impact of the new techniques across the range of AEP events modelled must be provided.</li> <li>(b) the development of the model Digital Terrain Model, including: source topography/bathymetry, grid size, the modelling of linear features, and the use of 1D elements.</li> <li>(c) how structures such as bridges, culverts and weirs were modelled, the source of the structure data used, and details of methods applied to verify structure afflux.</li> <li>(d) the derivation of the applied/calibrated roughness parameters, including a map showing the spatial patterns of the applied roughness parameters.</li> <li>(e) Verification of results by comparison to Council's MIKE 21 model across the range of events of interest to this study (50% AEP to the PMF). Results presented must include: <ul style="list-style-type: none"> <li>a. Maps presenting a comparison of peak level and velocity for selected events.</li> <li>b. Hydrographs providing a comparison of flow, level and velocity at a selected cross-section across the Barron River and at another selected cross-section across Thomatis/ Richters Creek near the subject site.</li> <li>c. A longsection showing a comparison of peak flood levels and velocities along the Barron River and Thomatis/ Richters Creek.</li> </ul> </li> <li>(f) If calibration to historical events has been performed, the methodology and results of that calibration. If the model used for calibration has a different configuration to the model used for verification, the differences must be clearly detailed.</li> <li>(g) An assessment of any issues or limitations associated with the use of the model for the purposes of the assessment, including, for example, issues associated with the modelling of the cross-drainage structures along the Captain Cook Highway, limitations associated with the use of the model for large events, etc.</li> </ul>	
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	(h) RPEQ certification that the adopted model is fit for the purpose of the various assessments outlined in Condition FA4 – FA15.	
FA7	<p>The assessment of the potential for the activity to increase property damage in floods, referred to in Condition FA4 (d), must be in accordance with the following conditions:</p> <ul style="list-style-type: none"> <li>(a) A conservative case/set of modelling cases must be developed to assess this potential impact for each of the following stages of the proposed activity: <ul style="list-style-type: none"> <li>a. Existing / Pre-project Stage</li> <li>b. Construction – Placement – Pipeline Deconstruction Stage</li> <li>c. First Wet Season Post-Placement Stage</li> <li>d. Handover Stage</li> <li>e. Final Landform Stage</li> </ul> </li> <li>(b) A detailed description of each of the modelled cases must be presented, including a description of the case's data, assumptions, methodology and results, to a standard that allows independent review.</li> <li>(c) This assessment must consider flooding up to the 1% AEP event.</li> <li>(d) Results presented to support this assessment must include: <ul style="list-style-type: none"> <li>a. Maps of flood level and afflux across the area affected by the proposal.</li> <li>b. Flood levels along long sections of the Barron River and Thomatis/ Richters Creek.</li> <li>c. Hydrographs of flow and flood level at a Barron River cross-section and a Thomatis/ Richters Creek cross-section near the Northern Sands site.</li> <li>d. Points of interest must be identified at residencies, on the highway, and at other key locations where property or infrastructure may be/are affected by the proposed works. The flood level and afflux for the modelled events must be tabulated at these locations.</li> </ul> </li> <li>(e) The results must be interpreted by a suitably qualified and experienced RPEQ, including comment on the size of the predicted impact for the modelled events at key locations and key limitations of the assessment and recommendations for mitigation or future analysis; and</li> <li>(f) A clear description of the recommendations of the assessment must be included.</li> </ul> <p>Note: With the dredge material placed before the wet season, and likely to settle during the wet season, it is the predicted level of dredge material at the start of the wet season which is likely to be critical for most aspects assessed. Predicted conditions at the start of November</p>	At all times

	are to be adopted for assessment of potential impacts and risks over that wet season.	
FA8	<p>As the Construction – Placement – Pipeline Deconstruction Stage is proposed to be undertaken largely during the drier part of the year, the likelihood of flooding will be less than that determined through standard annual design flood estimate techniques. If desired, estimates of design flood hydrographs in the AEP range required may be developed for the proposed conservative 'dry season' window for this stage rather than using the standard annual design flood estimates. If dry season estimates are not prepared, the standard annual design flood estimates must be applied to provide a conservative estimate of potential impacts in this stage.</p> <p>The modelling of the Construction – Placement – Pipeline Deconstruction Stage must include all key elements of the project in this stage, including the sections of the delivery pipeline, bunded area, and discharge pipeline proposed to sit above natural surface.</p>	At all times
FA9	<p>The assessment of the potential for the activity to increase the hazard for the community (in the absence of structural failure of the bund), referred to in Condition FA4 (e), must be in accordance with the following conditions:</p> <ul style="list-style-type: none"> <li>(a) A conservative case/set of modelling cases must be developed to assess this potential impact for each of the following stages of the proposed activity: <ul style="list-style-type: none"> <li>a. Existing / Pre-project Stage</li> <li>b. Construction – Placement – Pipeline Deconstruction Stage</li> <li>c. First Wet Season Post-Placement Stage</li> <li>d. Handover Stage</li> <li>e. Final Landform Stage</li> </ul> </li> <li>(b) A detailed description of each of the modelled cases must be presented, including a description of the case's data, assumptions, methodology and results, to a standard that allows independent review.</li> <li>(c) This assessment must consider flooding up to the PMF event.</li> <li>(d) Results presented to support this assessment must include: <ul style="list-style-type: none"> <li>a. Maps of flood depth, afflux, velocity, velocity difference and hazard across the area affected by the proposal.</li> <li>b. Points of interest must be identified near residencies, on the highway, on potential escape routes and at other key locations where risk to human life may be affected by the proposed works. The depth, velocity, hazard and the change in these parameters for the modelled events must be tabulated at these locations.</li> </ul> </li> </ul>	At all times

	<ul style="list-style-type: none"> <li>(e) The results must be interpreted by a suitably qualified and experienced RPEQ, including comment on the size of the predicted impact for the modelled events at key locations, key limitations of the assessment, and recommendations for mitigation or future analysis; and</li> <li>(f) A clear description of the recommendations of the assessment must be included.</li> </ul>	
FA10	<p>The assessment of the hazard associated with the potential structural failure of the bund, referred to in Condition FA4 (f), must be in accordance with the following conditions:</p> <ul style="list-style-type: none"> <li>(a) This assessment must be in accordance with the latest versions of the Queensland State Government's "Guidelines for Failure Impact Assessment of Water Dams", the "Manual for Assessing Consequence Categories and Hydraulic Performance of Structures", and the guideline on "Structures which are dams or levees constructed as part of environmentally relevant activities".</li> <li>(b) The data, assumptions, methodology and results of this assessment must be presented, to a standard that allows independent review.</li> <li>(c) The assessment must include a Consequence Category Assessment in compliance with the guidance in the Manual for Assessing Consequence Categories and Hydraulic Performance of Structures.</li> <li>(d) The capacity of the spillway on the bunded structure must be in accordance with the guidance in the "Manual for Assessing Consequence Categories and Hydraulic Performance of Structures"</li> <li>(e) An appropriate freeboard must be defined to account for uncertainties to provide confidence that the required spillway capacity flood (the internal flooding AEP event) will not overtop the bund.</li> <li>(f) The assessment must include an assessment of the population at risk associated with an extreme local event and for a sunny day failure.</li> <li>(g) For the sunny day failure case the water level inside the bund must be assumed to be at least at the spillway level.</li> <li>(h) For the extreme local event failure case the bund may be assumed to fail at the lowest point of overtopping of an unprotected bund crest.</li> <li>(i) For the sunny day failure case the bund may fail at any location along its length, and conservative case/s must be assessed where a higher population at risk (PAR) is considered possible.</li> <li>(j) An equivalent population at risk estimate must be developed for itinerants in the affected areas, with reference to relevant guidelines such as the ANCOLD Guidelines on the Consequence Categories for Dams,</li> </ul>	At all times

	<p>for example on the nearby heavily trafficked Captain Cook highway.</p> <p>(k) The results must be interpreted by a suitably qualified and experienced RPEQ, including comment on the size of the predicted impact for the modelled events at key locations, key limitations of the assessment, and recommendations for mitigation or future analysis; and</p> <p>(l) A clear description of the recommendations of the assessment must be included.</p>	
FA11	<p>The assessment of the impact of the activity on the potential for erosion, referred to in Condition FA4 (g), must be in accordance with the following conditions:</p> <p>(a) A conservative case/set of modelling cases must be developed to assess this potential impact for each of the following stages of the proposed activity:</p> <ol style="list-style-type: none"> <li>Existing / Pre-project Stage</li> <li>First Wet Season Post-Placement Stage</li> <li>Handover Stage</li> <li>Final Landform Stage</li> </ol> <p>(b) A detailed description of each of the modelled cases must be presented, including a description of the case's data, assumptions, methodology and results, to a standard that allows independent review.</p> <p>(c) This assessment must consider flooding up to the 1% AEP event.</p> <p>(d) Results presented to support this assessment must include:</p> <ol style="list-style-type: none"> <li>Maps of velocity and velocity difference across the area affected by the proposal.</li> <li>Flood levels and velocity along a longsection of the Barron River. Velocity should be computed as the peak of the average cross-sectional velocity of the main channel flow.</li> <li>Flood levels and velocity along a longsection of Thomatis/ Richters Creek. Velocity should be computed as the peak of the average cross-sectional velocity of the main channel flow.</li> </ol> <p>(e) The results must be interpreted by a suitably qualified and experienced RPEQ. The potential change in erosion risk to the Barron River, Thomatis/ Richters Creek and the Barron River flood plain must be discussed. The potential erosion risk to the bund and other site structures must be discussed. The acceptability of the results must be discussed, and mitigation measures recommended if required or desirable;</p> <p>(f) A clear description of the recommendations of the assessment must be included.</p>	At all times

FA12	<p>The assessment of the impact of the activity on the potential resuspension risk of the placed dredge material during a flood, referred to in Condition FA4 (h), must be in accordance with the following conditions:</p> <ul style="list-style-type: none"> <li>(a) An appropriate bund crest level design AEP to reduce the probability of overtopping, with the objective of limiting the risk of resuspension and/or bund failure, must be defined.</li> <li>(b) An appropriate freeboard must be defined to account for uncertainties to provide confidence that the bund crest level design external flooding AEP event will not overtop the bund.</li> <li>(c) The performance of the proposed balancing pipes in limiting the potential for erosion and resuspension when the bund overtops must be assessed.</li> <li>(d) Estimates of appropriate thresholds for resuspension of the placed material must be developed based on 3D hydraulic modelling, physical testing, previous studies and/or available guidance.</li> <li>(e) The risk of resuspension must be assessed for the following stages of the project: <ul style="list-style-type: none"> <li>a. First Wet Season Post-Placement Stage</li> <li>b. First Wet Season Post-Bund Removal Stage</li> </ul> </li> <li>(f) Maps of peak velocity and/or bed shear stress for a critical overtopping event must be provided.</li> <li>(g) The minimum water cover depth to reduce the resuspension risk in accordance with the determined thresholds must be determined. The bund (or edge of the void after the bund is removed) must provide the required minimum water cover depth at all times after 1 November of the first wet season.</li> <li>(h) A section along the bund alignment showing the bund's estimated external flooding design AEP event levels, the estimated internal flooding design AEP event level, and the proposed bund and spillway crest levels must be provided. The estimated dredge material level on 1 November of the first wet season must also be shown, along with the derived minimum water cover depth to limit the risk of resuspension.</li> <li>(i) The results must be interpreted by a suitably qualified and experienced RPEQ, including comment on the size of the predicted impact, key limitations of the assessment, and recommendations for mitigation or future analysis; and</li> <li>(j) A clear description of the recommendations of the assessment must be included.</li> </ul>	At all times
FA13	A Severe Storm Impact Statement in accordance, referred to in Condition FA4 (i), must be prepared in accordance with the guidance in QUDM.	Prior to activity commencement



	A clear description of the recommendations from the Severe Storm Impact Statement must be included.	
FA14	<p>A Sensitivity Analysis, referred to in Condition FA4 (j), must assess the sensitivity of the modelling results to uncertainty in the key parameters of uncertainty in this project, including:</p> <ul style="list-style-type: none"> <li>(a) Delays in the timing of the project stages, caused by dredging delays, slow settlement, water quality issues, or other issues;</li> <li>(b) The temporal and spatial pattern of flood event rainfall;</li> <li>(c) Assumed floodplain and channel roughness.</li> </ul> <p>A clear description of the recommendations from this Sensitivity Analysis must be included.</p>	Prior to activity commencement
FA15	<p>If the proposed works/activities are further updated after the completion of the Flood Assessment, an assessment of the likelihood of the changes affecting the results of the Flood Assessment must be undertaken by a suitably qualified and experienced RPEQ, and if significant changes are possible then the Flood Assessment must be updated to be consistent with the latest details of the proposed works/activity and appropriate changes made to the SBMP and subordinate site operational plans.</p> <p>Any amendments to the FRA must be authorised in writing by the Chief Executive Officer of Cairns Regional Council, and an updated copy of the RFLP must be provided to Cairns Regional Council within five (5) business days of the amendment being authorised.</p>	As specified within condition
FA16	As part of the annual report for the site, certification must be included by a suitably qualified and experienced RPEQ that the intent of the flood operation related procedures in the site operational plans have been complied with.	As specified within condition
<b>Monitoring, auditing and reporting (MAR)</b>		
MAR1	<p>The following details of all environmental complaints received must be recorded:</p> <ul style="list-style-type: none"> <li>(a) date and time the complaint was received;</li> <li>(b) name and contact details of the complainant when provided and authorised by the complainant;</li> <li>(c) nature of the complaint;</li> <li>(d) investigation undertaken;</li> <li>(e) conclusions formed;</li> <li>(f) actions taken.</li> </ul>	At all times
MAR2	Any auditors engaged must be suitably qualified and experienced and be independent of contractual arrangement for the design and construction of the project or any other activities on the Northern Sands site. Any such auditors must be engaged for the duration of the activity for the carrying out of monitoring, reporting and auditing as specified within the conditions of this approval or any associated environmental authority.	As specified within condition

MAR3	A suitably qualified and experienced person or persons must monitor, audit, report, record and interpret all indicators that are required to be monitored, reported, recorded or audited by this approval and any associated environmental authority and in the manner specified by this approval and any associated environmental authority and the Site Based Management Plan contained within Condition SBMP1.	As specified within condition
MAR4	A monitoring report must be prepared by a suitably qualified and experienced person every month from commencement of the first works authorised under this approval and any associated environmental authority until the completion of the project, unless otherwise agreed in writing by the Chief Executive Officer of Cairns Regional Council. The report shall include but not be limited to: (a) All monitoring results obtained under the monitoring programs specified by the conditions of this approval and, in graphical form showing relevant limits, a comparison of the monitoring results to both limits of this authority and the relevant prior results; (b) An evaluation and interpretation of the data from any monitoring programs; (c) A summary of any remedial actions required to ensure compliance with this authority; (d) A summary of the record of equipment failures or events recorded for any site under this authority; and (e) Actions taken or proposed to be taken to minimise the environmental risk from any deficiency identified by the monitoring or recording programs.	As specified within condition
MAR5	The monitoring reports required by Condition MAR4 must be submitted to the Chief Executive Officer of Cairns Regional Council within twenty (20) business days of the end of the agreed reporting period.	As specified within condition
MAR6	Compliance with the conditions of this approval, including any associated environmental authority, must be audited within 28 days of the commencement of the activity and be carried out every year thereafter until the completion of the project, being defined by Condition MCU23.	As specified within condition
MAR7	When required by the Chief Executive Officer of Cairns Regional Council, monitoring must be undertaken in the manner prescribed, to investigate a report of environmental nuisance arising from the activity. The monitoring results must be provided to Cairns Regional Council, or nominated delegate, within the required timeframe and in the specified format upon request.	As specified within condition
MAR8	The following information must be provided to the Chief Executive Officer of Cairns Regional Council within three (3) days following any notification in accordance with Conditions MCU10 and MMCU11 of this approval: (a) The name of the operator; (b) The name and telephone number of a designated contact person; (c) The location of the release / event;	As specified within condition

	(d) The climatic conditions at the time of the release / event; (e) The time of the release / event; (f) The time of becoming aware of the release / event; (g) The suspected cause of the release / event; (h) A description of the resulting effects of the release / event; (i) The result of sampling performed in relation to the release / event; (j) Actions taken to mitigate any environmental harm and / or environmental nuisance caused by the release / event; and (k) Proposed actions to prevent a recurrence of the release / event.	
MAR9	All <i>ex situ</i> analyses required under this approval and any associated environmental authority must be carried out by a laboratory that has National Association of Testing Authorities (NATA) accreditation, or an equivalent accreditation, for such analyses.	At all times
MAR10	The costs associated with any auditing requirements specified within the conditions of this approval are to be borne entirely by the holder of the approval.	At all times
MAR11	A record must be maintained of the time, date and duration of any equipment malfunctions. The record must be kept until completion of the project and must be provided within 24 hours upon request by the Chief Executive Officer of Cairns Regional Council.	At all times
MAR12	Environmental monitoring results must be kept until completion of the project. All other information and records that are required by this approval must be kept for a minimum of five (5) years. All information and records required by the conditions of this approval or an associated environmental authority must be provided to Cairns Regional Council, or nominated delegate upon request, within the required timeframe and in the specified format.	As specified within condition

### Definitions

**Completion of the project** is placed materials achieving a final settlement density consistent with the targeted bulk density (MCU23) and cessation of surface water discharges associated with the project.

**Northern Sands Dredge Material Placement Area (DMPA)** includes all areas on Lot 2 on SP712954 and Lot 5 on SP245573 necessary to effect dredge material placement, including but not limited to the void, bunds, pipelines, planned infrastructure and access.

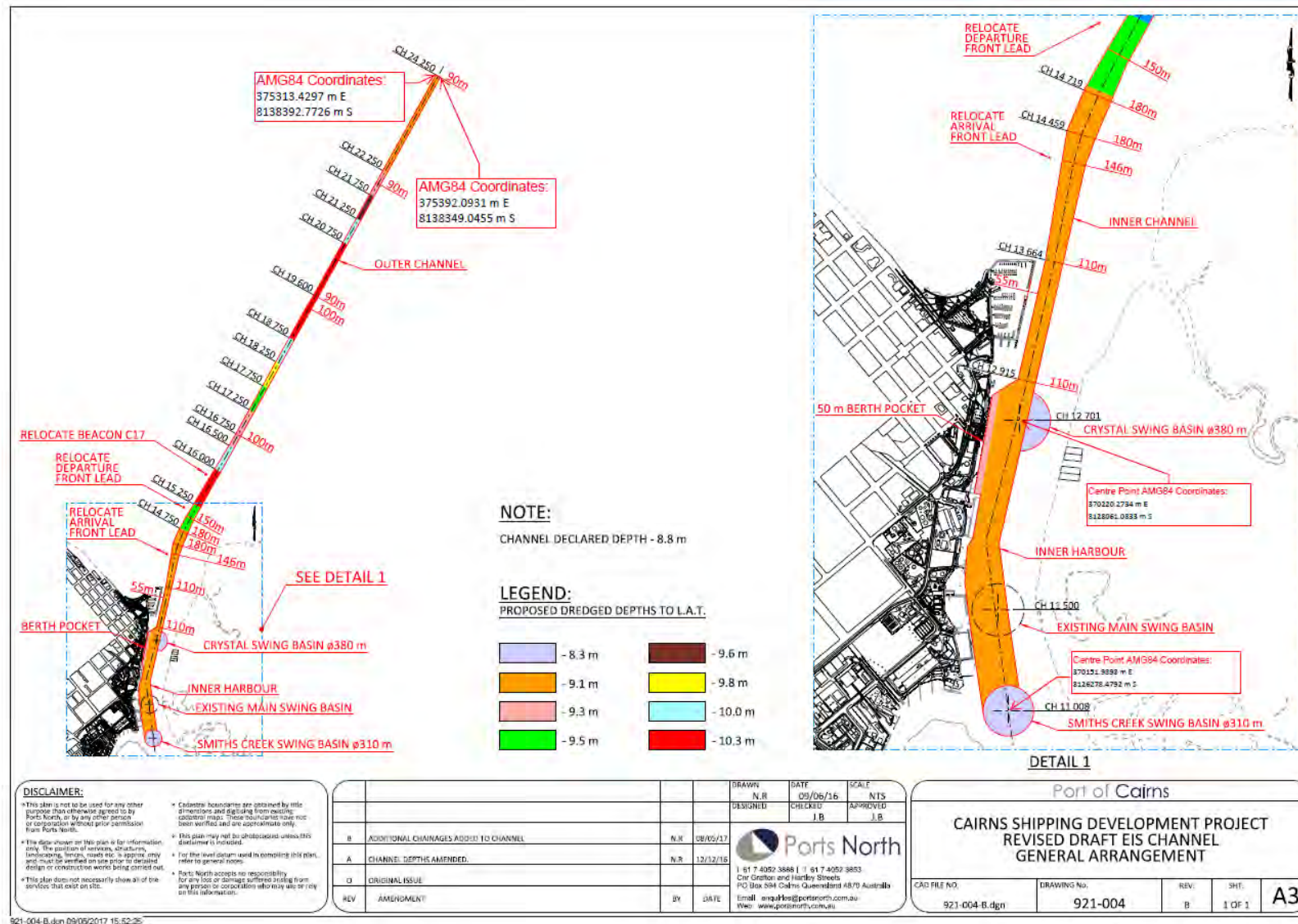
## Schedule 4. Preliminary approval for Operational Works for capital dredging of the Trinity Inlet

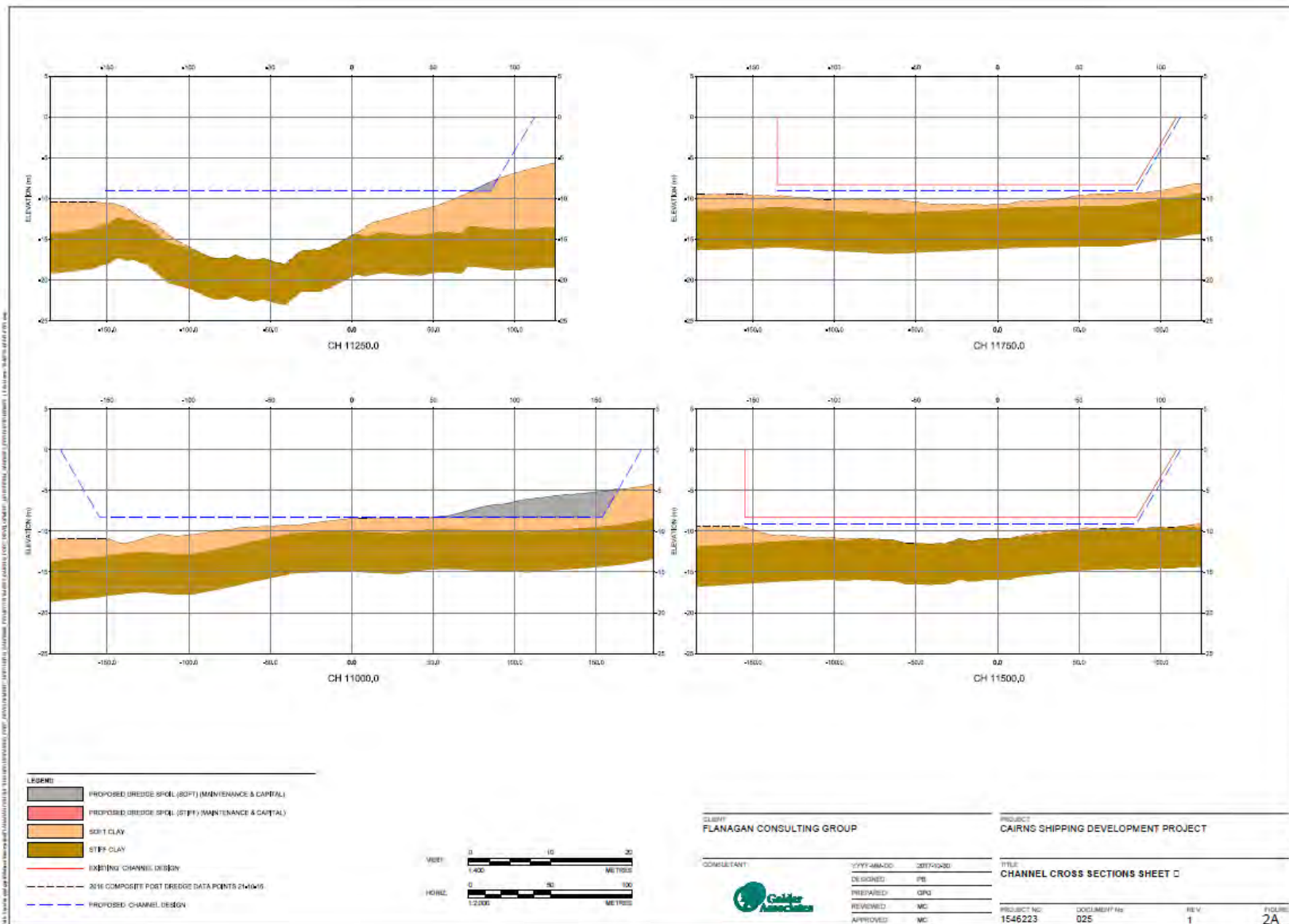
This schedule includes the Coordinator-General's stated conditions for an operational works approval (tidal work/prescribed tidal work) under the *Planning Act 2016* for capital dredging of the Trinity Inlet, stated under section 39 of the *State Development and Public Works Organisation Act 1971*. The entity with jurisdiction for conditions in this schedule is the Department of Environment and Science.

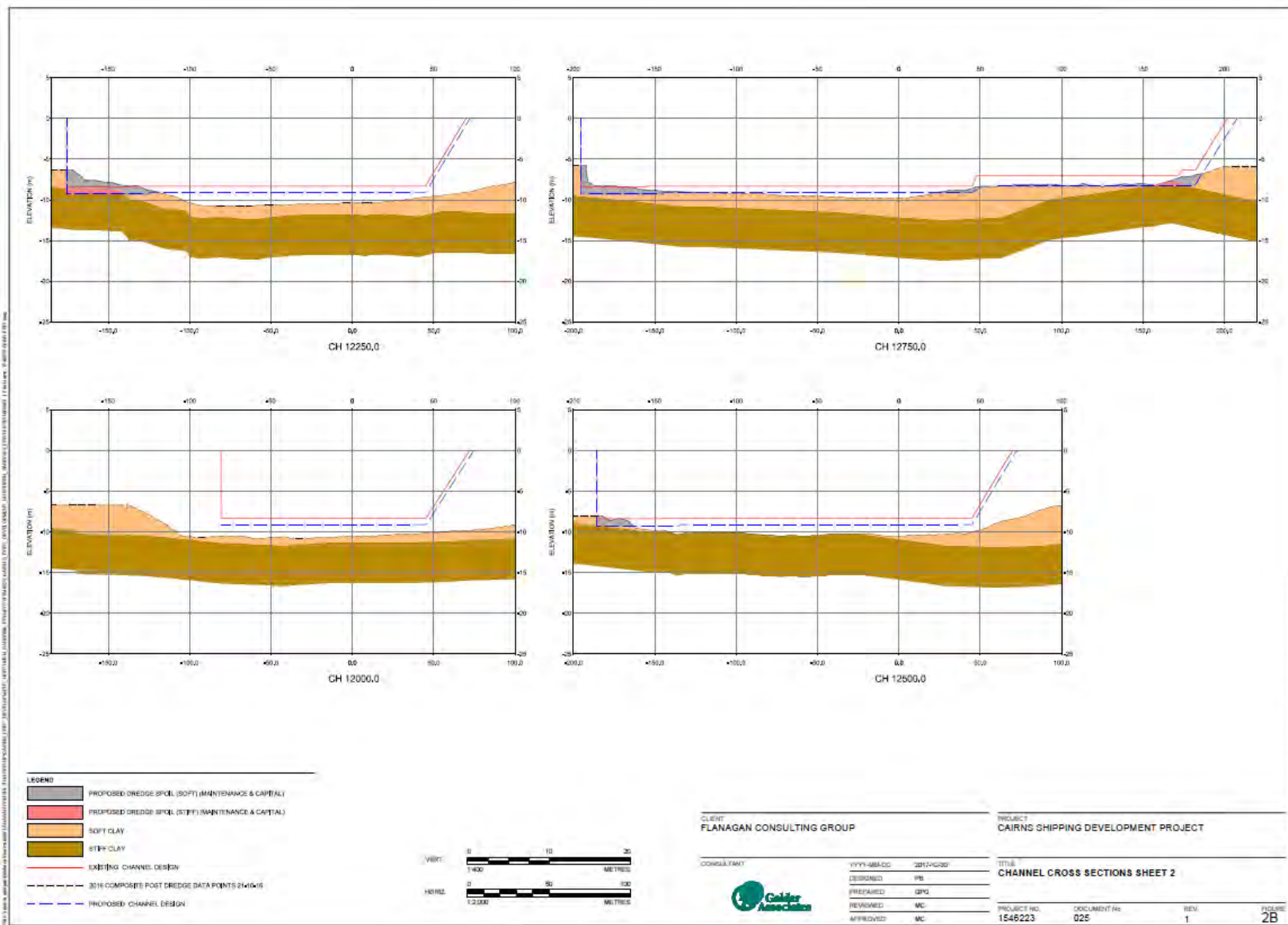
Condition number	Condition
1	<p>The development must be carried out generally in accordance with the following plans:</p> <p>General Arrangement, prepared by Ports North, dated 08.05.2017, drawing number 921-004 revision B.</p> <p>Cross Section Sheet 1, prepared by Golder Associates, dated 30-10-2017, project number 1546223, document number 025, revision 1, Figure 2A.</p> <p>Channel Cross Section Sheet 2, prepared by Golder Associates, dated 30-10-2017, project number 1546223, document number 025, revision 1, Figure 2B.</p> <p>Channel Cross Section Sheet 3, prepared by Golder Associates, dated 30-10-2017, project number 1546223, document number 025, revision 1, Figure 2C.</p> <p>Channel Cross Section Sheet 4, prepared by Golder Associates, dated 30-10-2017, project number 1546223, document number 025, revision 1, Figure 2D.</p> <p>Channel Cross Section Sheet 5, prepared by Golder Associates, dated 30-10-2017, project number 1546223, document number 025, revision 1, Figure 2E.</p> <p>Channel Cross Section Sheet 6, prepared by Golder Associates, dated 30-10-2017, project number 1546223, document number 025, revision 1, Figure 2F.</p> <p>Channel Cross Section Sheet 7, prepared by Golder Associates, dated 30-10-2017, project number 1546223, document number 025, revision 1, Figure 2G.</p> <p>Channel Cross Section Sheet 8, prepared by Golder Associates, dated 30-10-2017, project number 1546223, document number 025, revision 1, Figure 2H.</p> <p>Channel Cross Section Sheet 9, prepared by Golder Associates, dated 30-10-2017, project number 1546223, document number 025, revision 1, Figure 2I.</p> <p>Channel Cross Section Sheet 10, prepared by Golder Associates, dated 30-10-2017, project number 1546223, document number 025, revision 1, Figure 2J.</p> <p><b>Timing: For the duration of works.</b></p>

Condition number	Condition
2	<p>The development must be carried out generally in accordance with the Revised EIS prepared by Flanagan Consulting Group and BMT WBM dated July 2017, in particular:</p> <ul style="list-style-type: none"> <li>• Chapter A3 - Project Description</li> <li>• Chapter C1 - Construction EMP</li> <li>• Chapter C2 - Dredge Management Plan</li> </ul> <p><b>Timing: For the duration of construction works.</b></p>
3	<p>(a) Obtain Registered Professional Engineer of Queensland (RPEQ) certification confirming that the tidal works, have been constructed in accordance with the <b>administrative authority's</b> guideline <i>Building and engineering standards for tidal works</i>.</p> <p>(b) A copy of the certification must be provided to <a href="mailto:palm@ehp.qld.gov.au">palm@ehp.qld.gov.au</a> or mailed to:</p> <p style="padding-left: 40px;">Department of Environment and Science Permit and License Management Implementation and Support Unit GPO Box 2454 Brisbane Qld 4001</p> <p><b>Timing: Within two (2) weeks of the completion of the works</b></p>



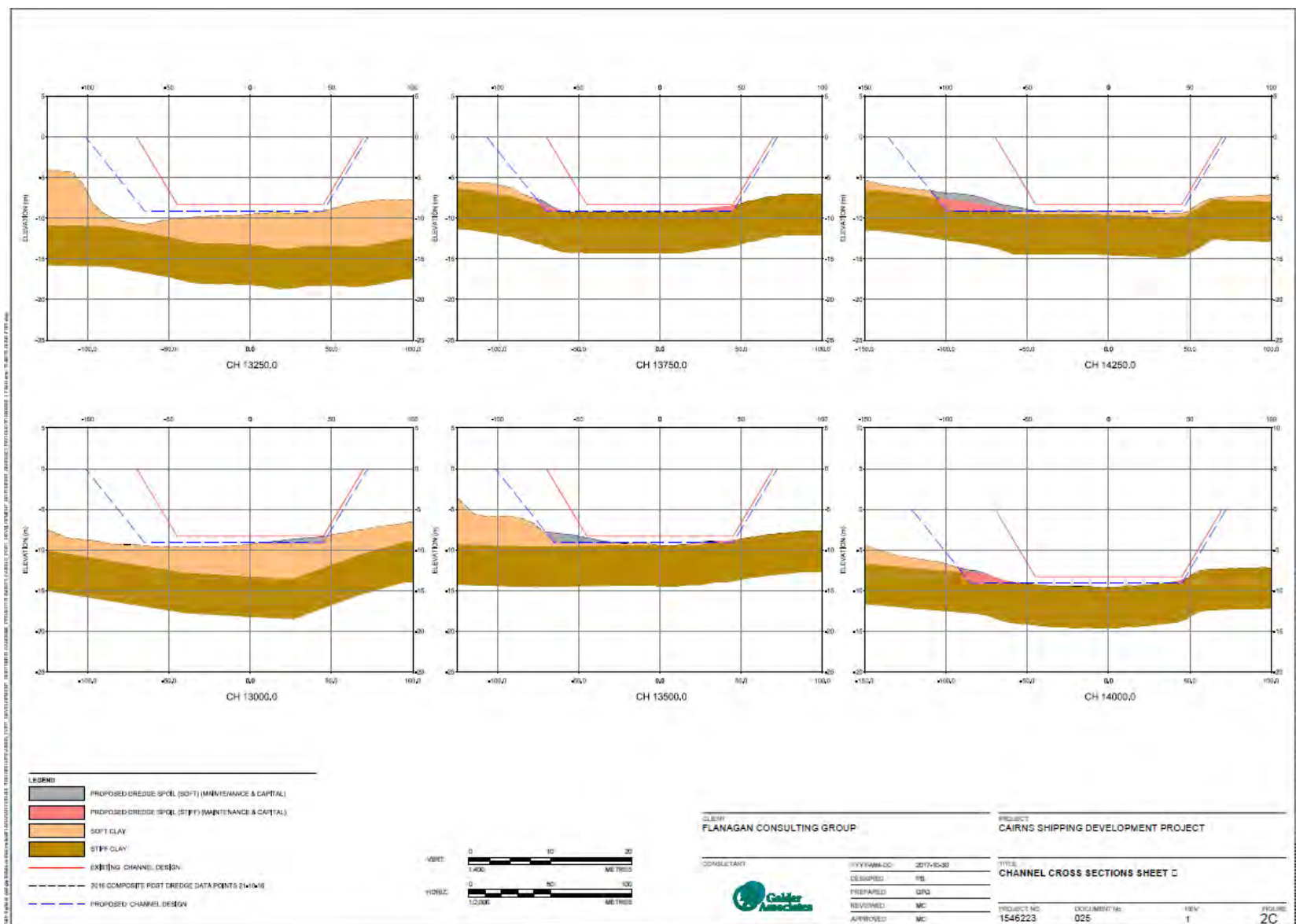


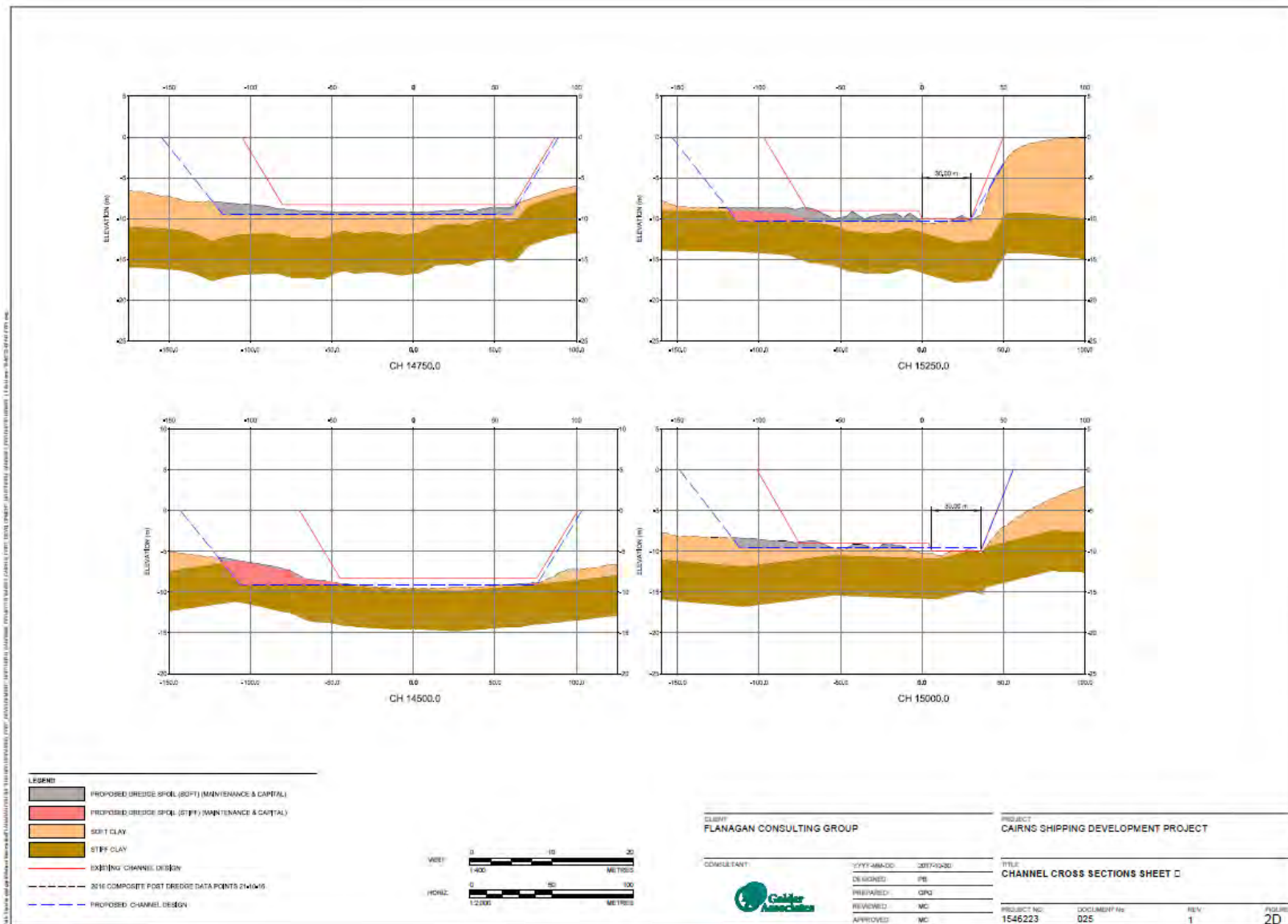




Cairns Shipping Development Project:  
Coordinator-General's evaluation report on the environmental impact statement

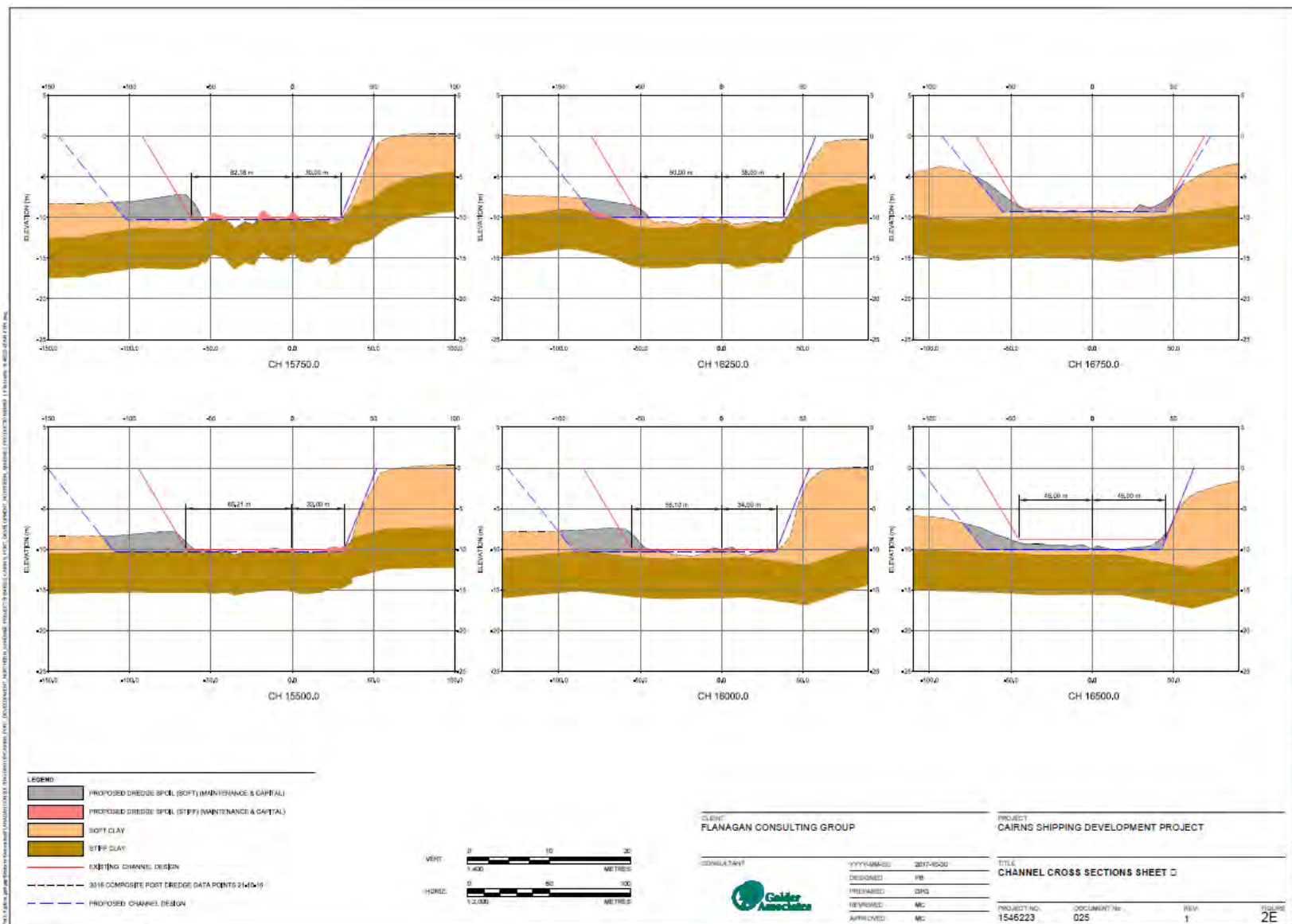


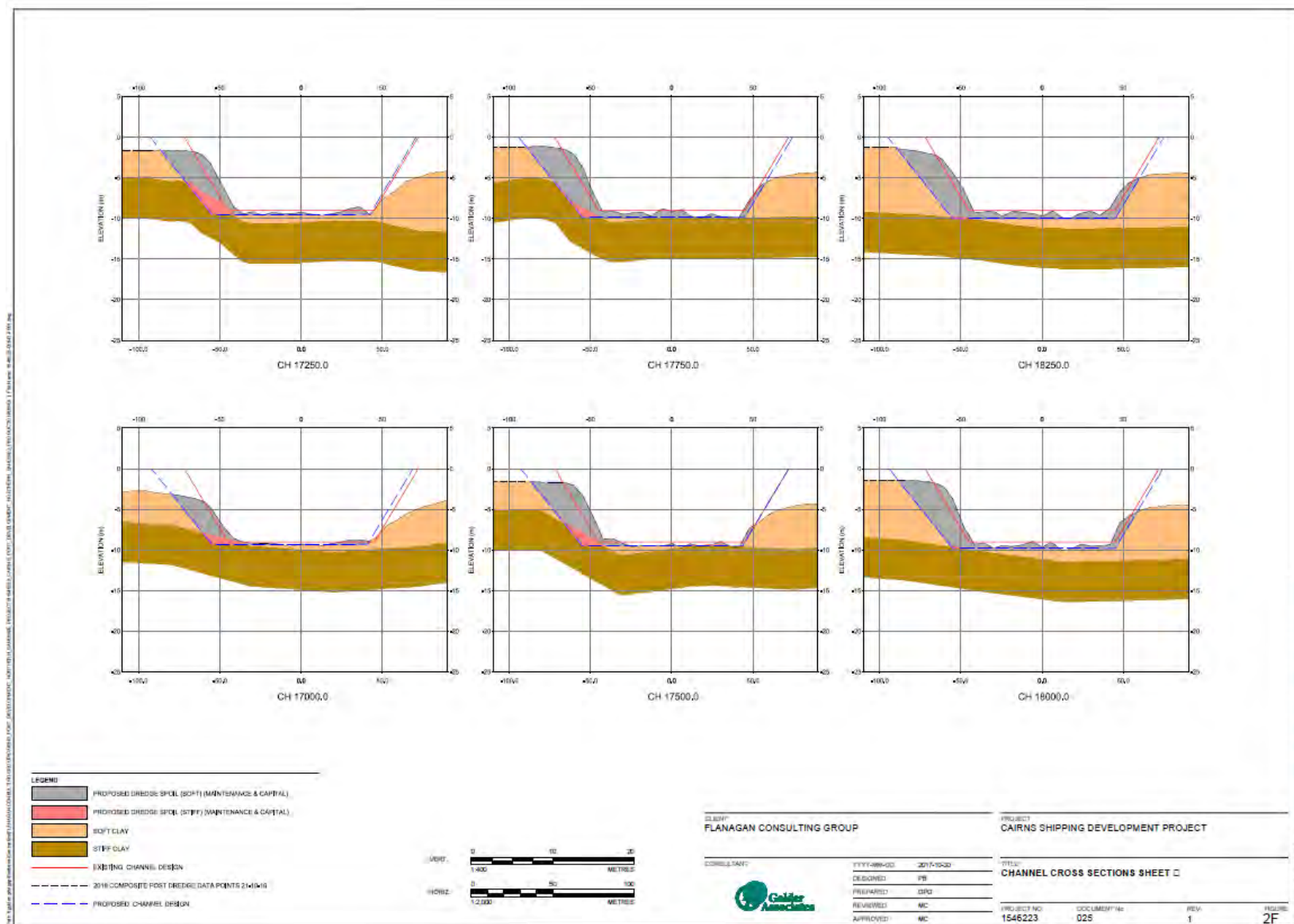




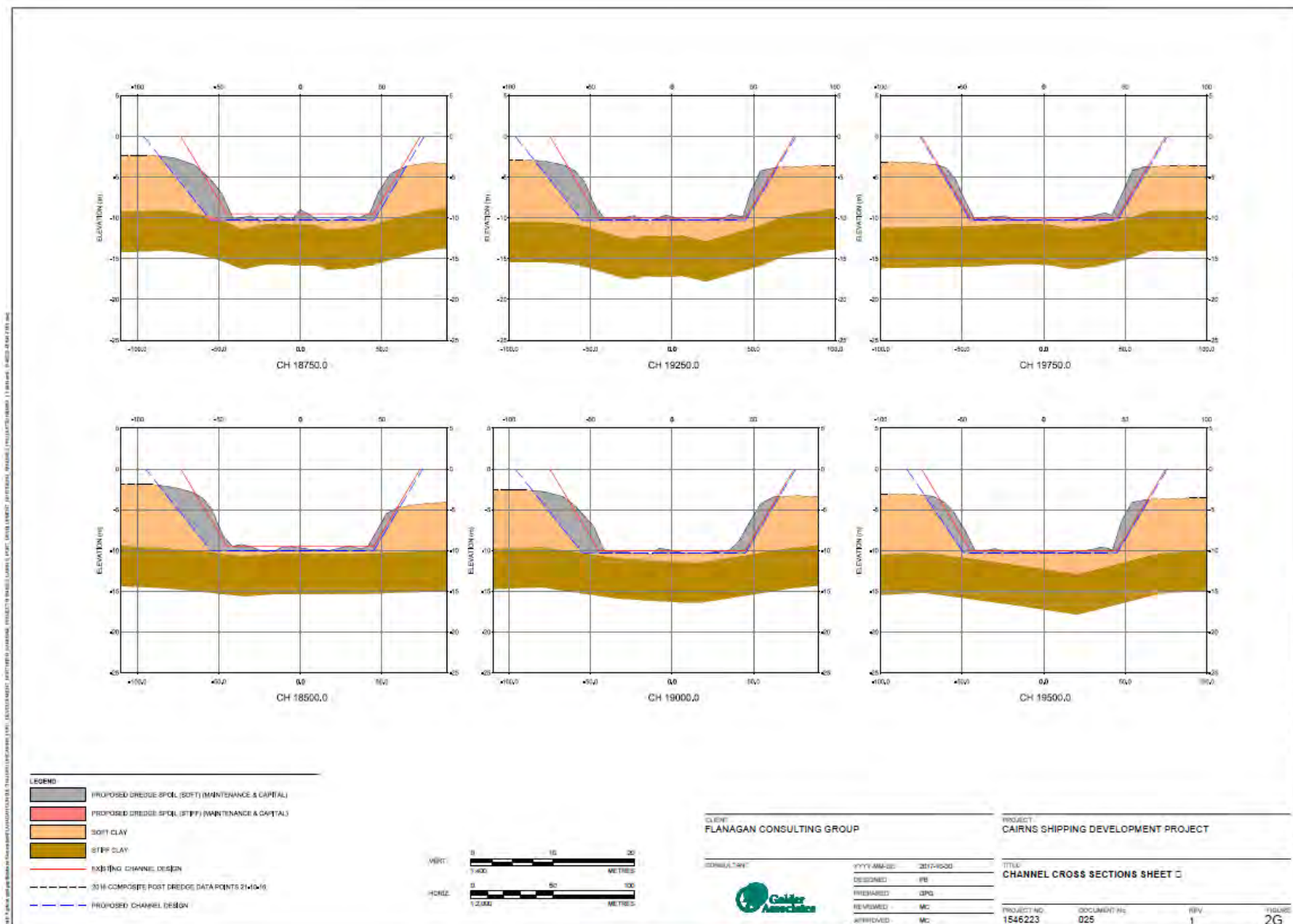
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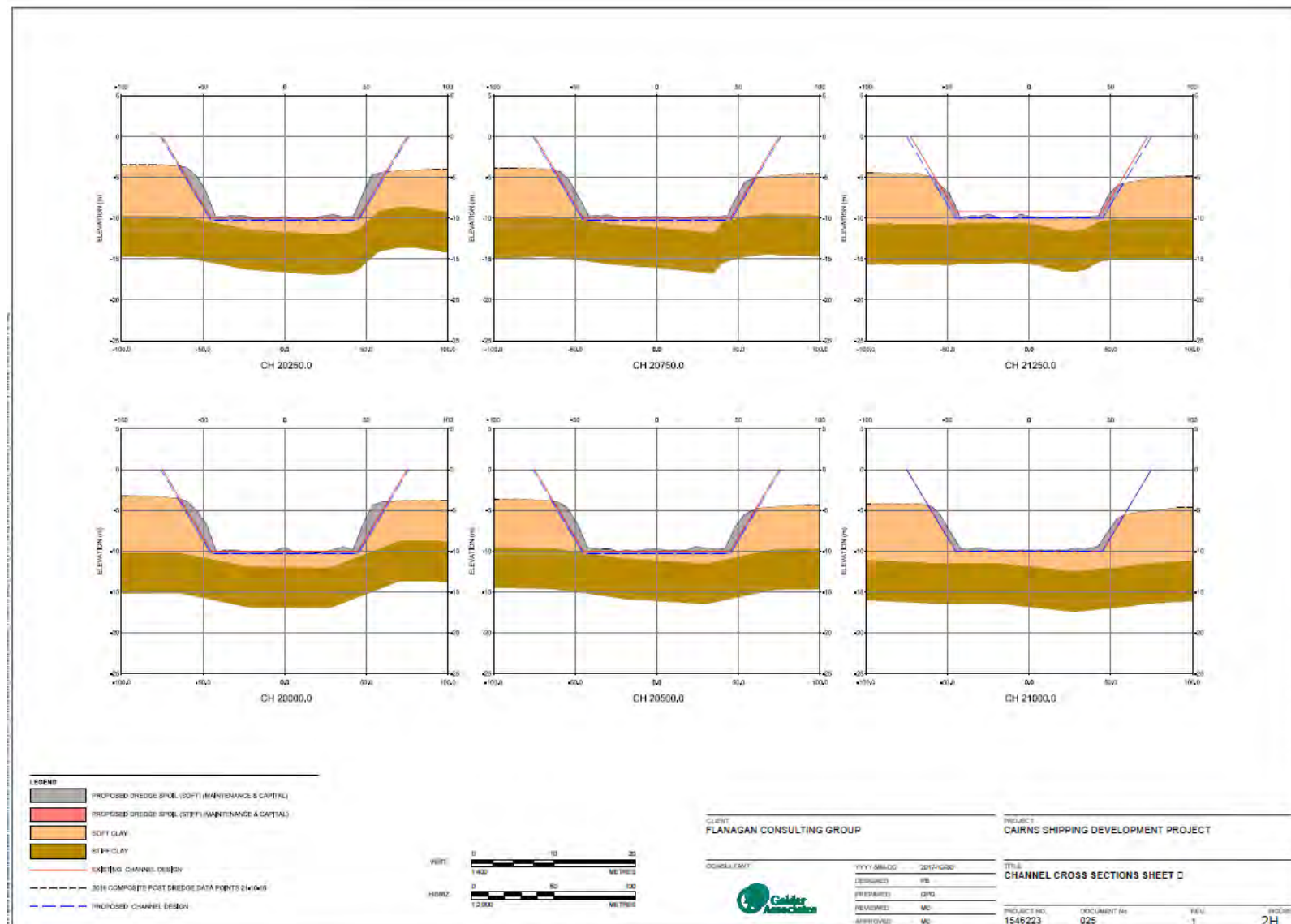




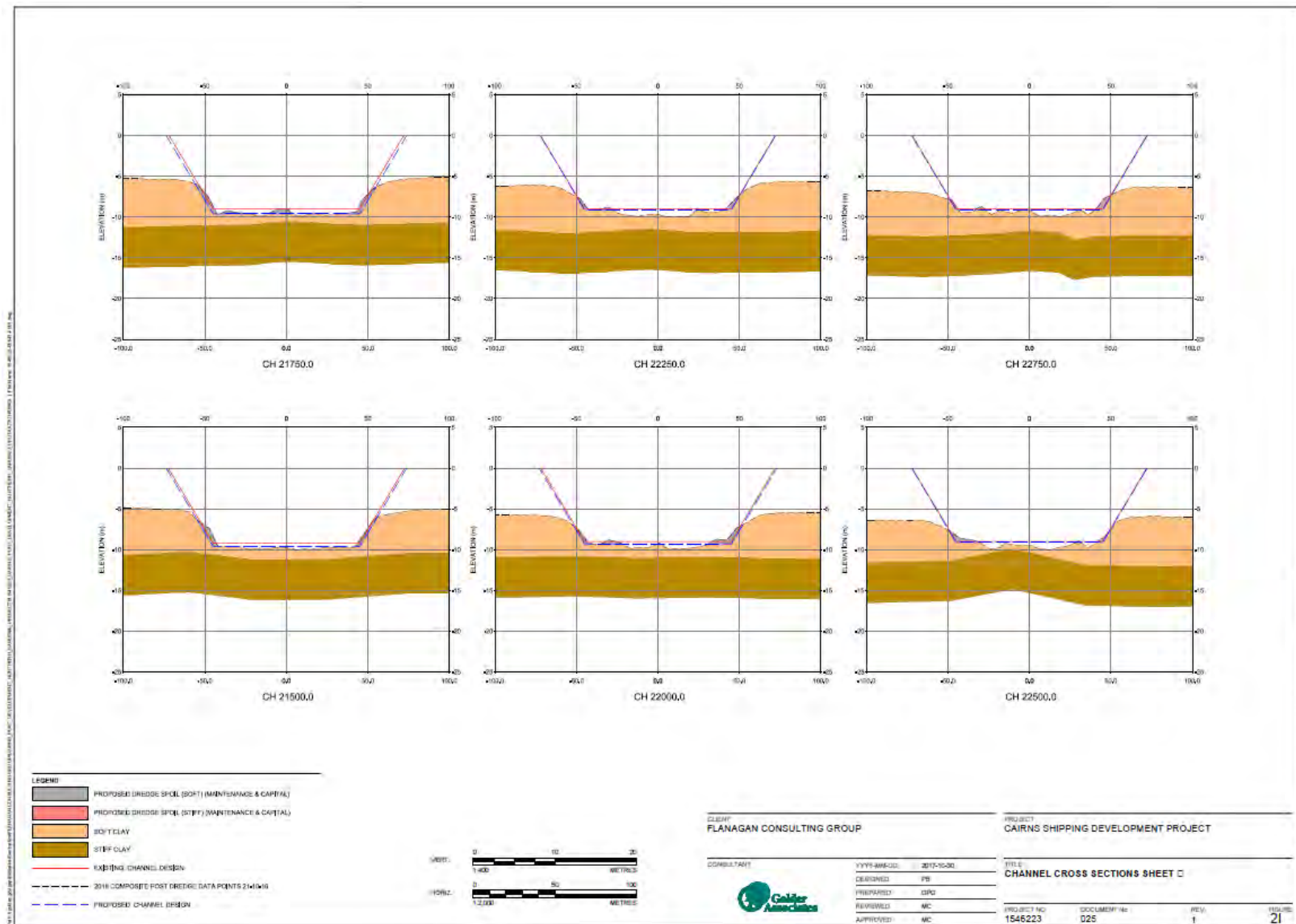


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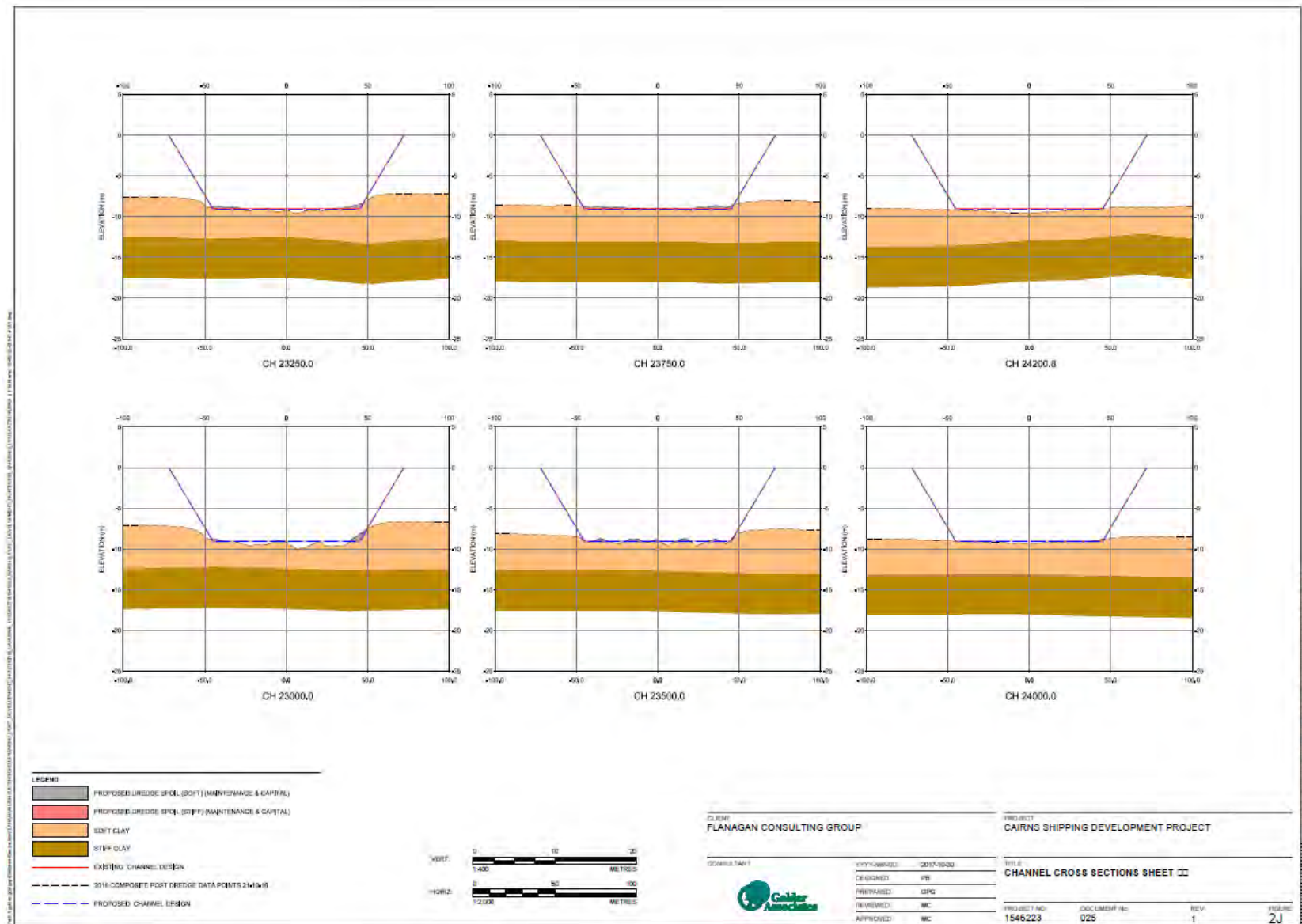










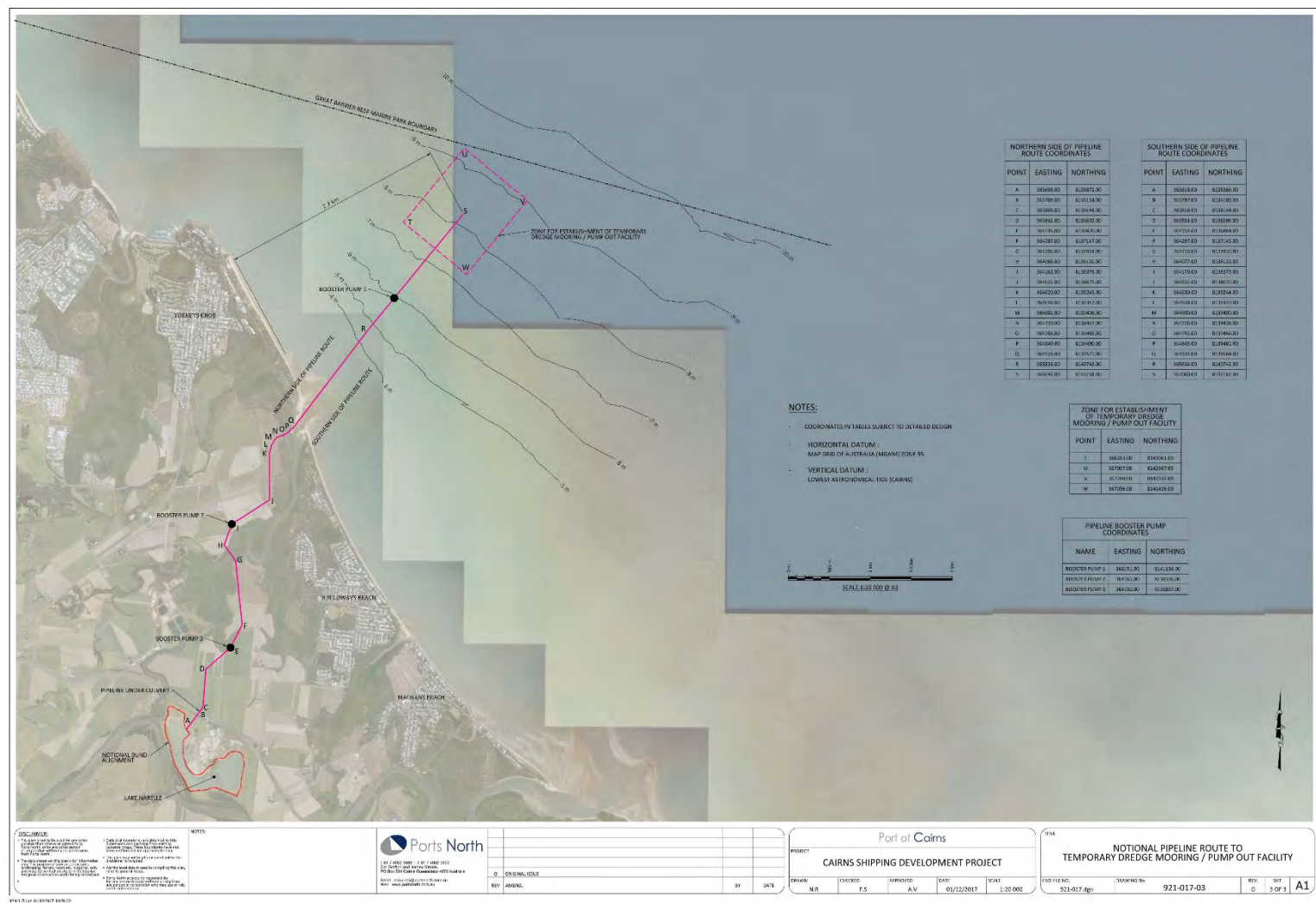


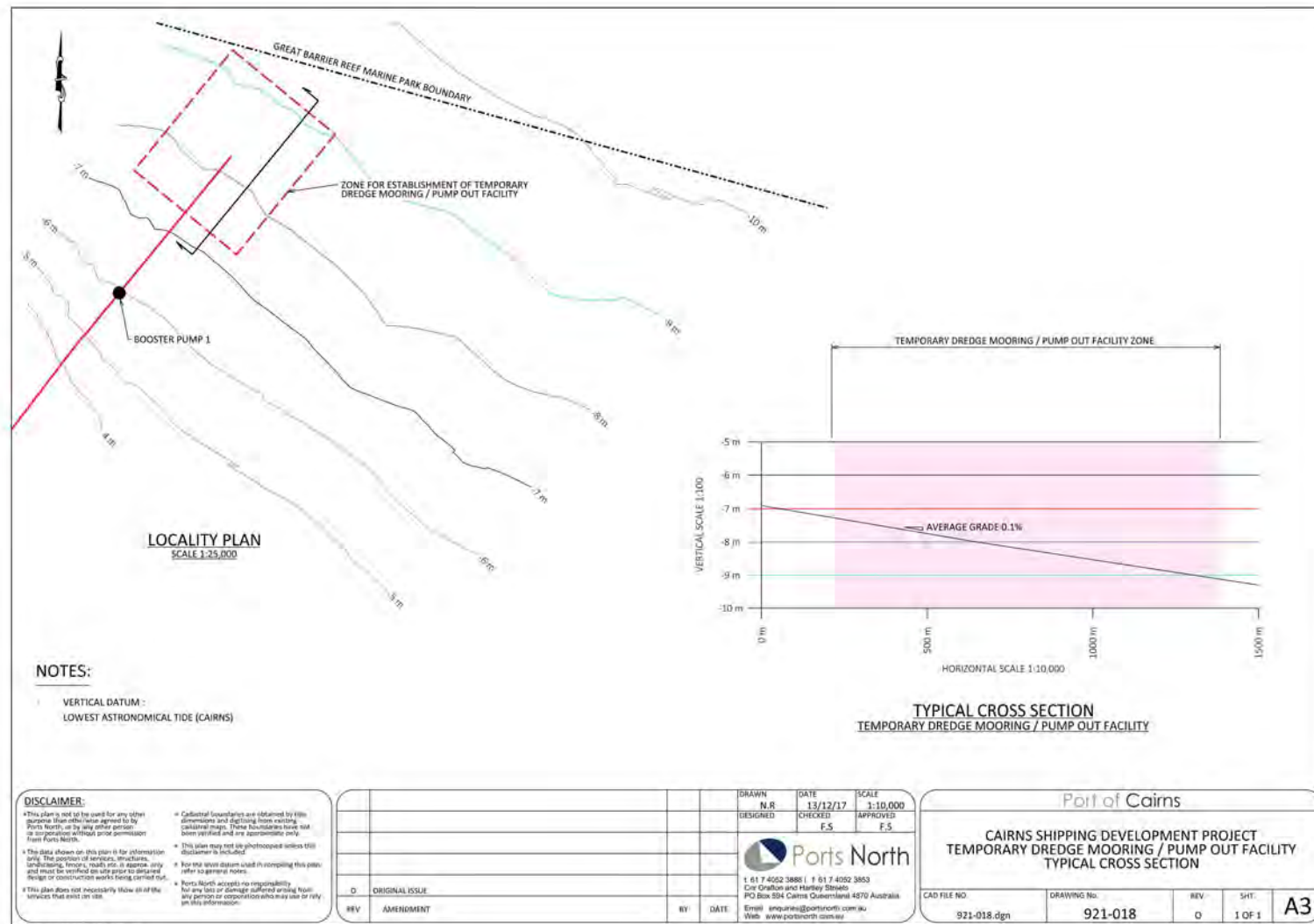
Cairns Shipping Development Project:  
Coordinator-General's evaluation report on the environmental impact statement

## Schedule 5. Preliminary approval for Operational Works for dredge delivery pipeline and temporary mooring and pump-out facility

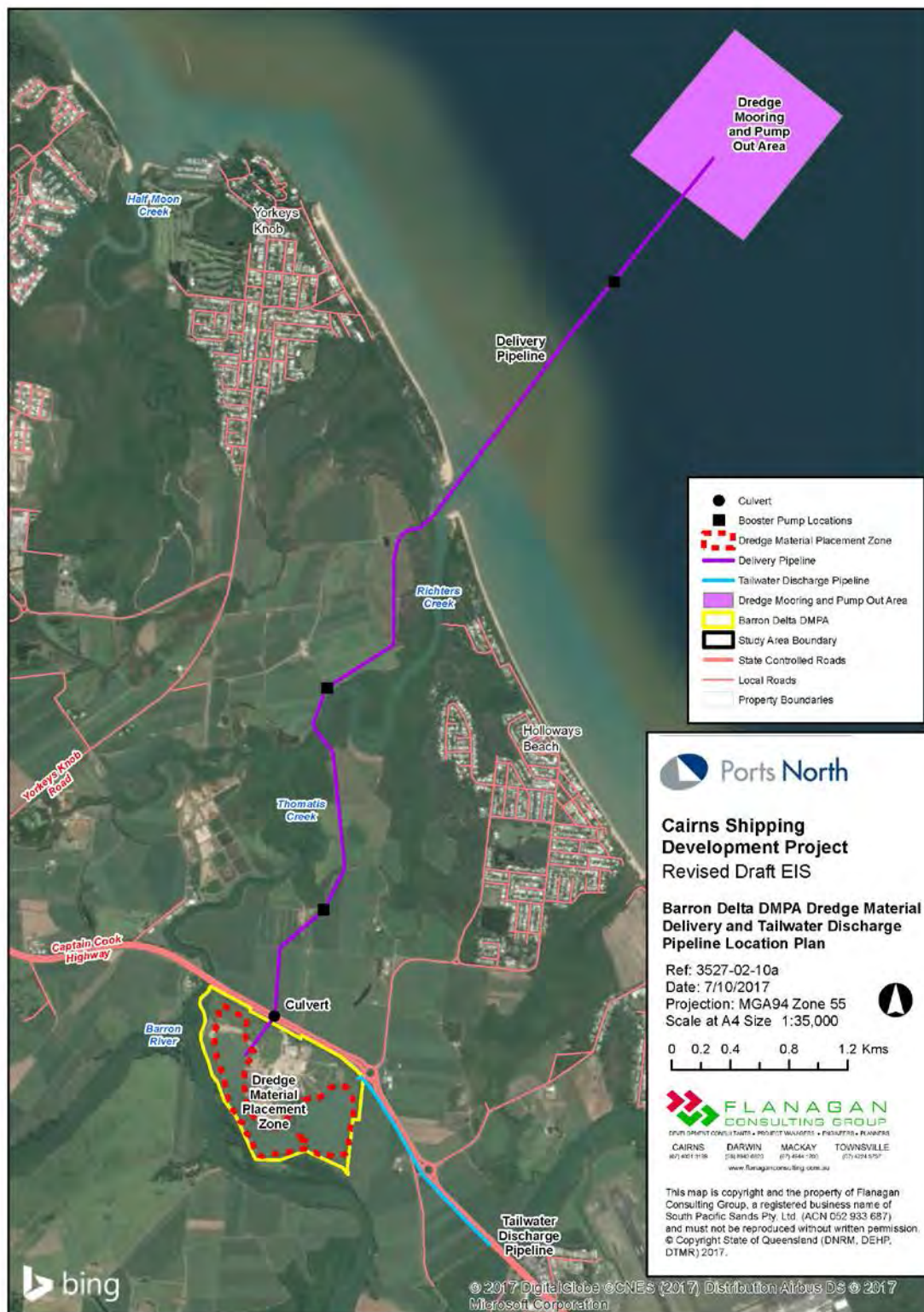
This schedule includes the Coordinator-General's stated conditions for an operational works approval (tidal work) under the *Planning Act 2016* for the installation of the dredge material delivery pipeline and temporary mooring and pump-out facility, stated under section 39 of the *State Development and Public Works Organisation Act 1971*. The entity with jurisdiction for conditions in this schedule is the Department of Environment and Science.

Condition number	Condition
1	<p>The development must be carried out generally in accordance with the following plans:</p> <ul style="list-style-type: none"> <li>a) Notional Pipeline Route to Temporary Dredge Mooring/Pump Out Facility, prepared by Ports North, dated 01.12.2017, drawing number 921-017-03 revision 0.</li> <li>b) Temporary Dredge Mooring/Pump Out Facility – Typical Cross Section, prepared by Ports North, dated 13.12.2017, drawing number 921-018 revision 0.</li> <li>c) Barron Delta DMPA Dredged material Delivery and Tailwater Discharge Location Plan, prepared by Flanagan Consulting Group, dated 07.10.2017, drawing number 3527-02-10a.</li> </ul> <p><b>Timing: For the duration of works.</b></p>
2	<p>The development must be carried out generally in accordance with the Revised EIS prepared by Flanagan Consulting Group and BMT WBM dated July 2017, in particular:</p> <ul style="list-style-type: none"> <li>• Chapter A3 - Project Description</li> <li>• Chapter C1 - Construction EMP</li> <li>• Chapter C2 - Dredge Management Plan</li> </ul> <p><b>Timing: For the duration of construction works.</b></p>











## Schedule 6. Preliminary approval for Operational Works for transportation and delivery pipeline (broad corridor only)

This schedule includes the Coordinator-General's stated conditions for an operational works approval under the *Planning Act 2016*, stated under section 39 of the *State Development and Public Works Organisation Act 1971*. The entity with jurisdiction for conditions in this schedule is the Cairns Regional Council.

Condition number	Condition		
OPW G1	The development must be carried out generally in accordance with the Final EIS and the Coordinator-General's Evaluation Report for the Cairns Shipping Development Project and the approved drawings, being:		
	<b>Drawing</b>	<b>Revision number</b>	<b>Date</b>
	TBA	TBA	TBA

## Schedule 7. Development permit for Operational Works for matters regulated under the *Fisheries Act 1994*

This schedule includes the Coordinator-General's stated conditions for operational works under the *Planning Act 2016*, stated under section 39 of the *State Development and Public Works Organisation Act 1971*. The entity with jurisdiction for conditions in this schedule is the Department of Agriculture and Fisheries.

### Part A. General conditions

These general conditions apply to approvals required under Part A, B, C and D of this Appendix.

Condition number	Condition	Timing
1	Provide written notice to notifications@daf.qld.gov.au, when the development authorised under this approval: <ul style="list-style-type: none"> <li>• will start, and</li> <li>• when it has been completed.</li> </ul>	(a) At least 5 business days but no greater than 20 business days prior to the commencement of the works (b) Within 15 business days of the completion of the fisheries development works.
2	This fisheries development (as defined by the <i>Fisheries Act 1994</i> ) constitutes a place that is required to be open for inspection by an inspector at all times, pursuant to section 145 of the <i>Fisheries Act 1994</i> .	At all times
3	Land profiles that are temporarily disturbed by the development works (other than those within the permanent development footprint), must be promptly restored to pre-work profiles.	Upon completion of the works the subject of this approval
4	Enter into an agreed delivery arrangement to deliver an environmental offset in accordance with the <i>Environmental Offsets Act 2014</i> to counterbalance any significant residual impact on matters of state environmental significance (marine plants, declared Fish Habitat Areas and waterways providing for fish passage).	Prior to commencing any works that impact on the prescribed environmental matters marine plants, declared Fish Habitat Areas and waterways providing for fish passage.
5	The development must not adversely impact on community access to fisheries resources and fish habitats including recreational and indigenous fishing access. The installation and removal of the temporary dredged material delivery pipe must take reasonable measures to minimise the disruption to community access to fisheries resources.	At all times
6	The development must not adversely impact on commercial fishing access and	At all times

Condition number	Condition	Timing
	linkages between a commercial fishery and infrastructure, services and facilities.	

**Part B. Development permit for Operational Works for removal, destruction or damage of a marine plant**

This operational works approval is for removal, destruction or damage of a marine plant in the dredge footprint, placement of the temporary dredge material delivery pipeline from the dredge mooring point to the Northern Sands DMPA, and placement of dredge spoil within the Tingira Street DMPA. The entity with jurisdiction for conditions in this schedule is the Department of Agriculture and Fisheries.

Condition number	Condition	Timing
1	<p>Development authorised under this approval is limited as follows:</p> <ul style="list-style-type: none"> <li>Operational works that is the removal, destruction or damage of marine plants being limited to: <ul style="list-style-type: none"> <li>dredging works within the 'proposed upgraded channel and swing basins' as detailed in Revised Draft EIS Channel, General Arrangement, Ports North, 08/05/2017, 921-004, Rev B;</li> <li>the placement of a temporary dredge material delivery pipeline within Thomatis/Richters Creeks;</li> <li>the placement of dredge spoil within an existing approved designated spoil disposal site at the Tingira Street DMPA.</li> </ul> </li> </ul>	At all times
2	Works involving the removal, destruction or damage of marine plants must be undertaken in accordance with the Accepted Development Requirements for operational work that is the removal, destruction or damage of marine plants or under a development approval (assessable development).	At all times
3	Development works must avoid, or where this cannot be reasonably achieved minimise/mitigate impacts to marine plants.	For the duration of the works the subject of this approval
4	Spoil is not to be disposed of on tidal lands or within waterways, other than in an existing approved designated spoil disposal site, and is managed to prevent acid soil development.	At all times
5	<p>a) Marine plants that are temporarily removed, damaged or destroyed by this development must be restored to pre-disturbance condition, or if this is not likely to be achieved;</p> <p>b) Enter into an agreed delivery arrangement to deliver an environmental offset in accordance with the <i>Environmental Offsets Act 2014</i> to</p>	<p>(a) Within 5 years of removal, damage or destruction;</p> <p>(b) Prior to commencing any works that impact on the prescribed environmental matters marine plants, declared Fish</p>

Condition number	Condition	Timing
	counterbalance any significant residual impact on matters of state environmental significance (marine plants).	Habitat Areas and waterways providing for fish passage.
6	The development works must be managed to prevent development works and associated activities (storage, parking, runoff, access) from indirectly impacting on marine plants and tidal fish habitats.	Prior to commencement of the works and maintained until their completion.
7	Marine plants authorised for removal and other material used in the development (e.g. debris, construction material, soil, etc.) are to be promptly removed from the intertidal zone.	For the duration of the works that are subject of this approval and to be maintained.
8	Only those aspects of the development that have a functional requirement to be located on tidal lands create the requirement to remove, destroy or damage marine plants.	At all times

**Part C.****Development permit for Operational Works for constructing or raising waterway barrier works**

This operational works approval is for placement of the dredge material delivery pipeline through the Thomatis/Richters Creeks. The entity with jurisdiction for conditions in this schedule is the Department of Agriculture and Fisheries.

Condition number	Condition	Timing
1	Development authorised under this approval is limited as follows: <ul style="list-style-type: none"><li>Operational works to raise or construct waterway barrier works that is the placement of a temporary dredge material delivery pipeline within Thomatis/Richters Creeks.</li></ul>	At all times
2	Works involving constructing or raising waterway barrier works must be undertaken in accordance with the Accepted Development Requirements for operational work that is constructing or raising waterway barrier works or under a development approval (assessable development).	At all times
3	Up and downstream fish passage must be provided across permanent waterway barriers and temporary waterway barriers that do not comply with the Accepted Development Requirements for operational work that is constructing or raising waterway barrier works.	At all times
4	The fish passage provided for permanent waterway barriers and temporary waterway barriers that do not comply with the Accepted Development Requirements for operational work that is constructing or raising waterway barrier works must cater for the whole fish community taking into account species, size classes, life stages and swimming abilities as well as the seasonal and flow related biomass of the fish community.	At all times
5	All waterway barriers and any associated infrastructure are to be constructed and maintained to avoid fish injury, mortality and/or entrapment.	At all times
6	Any temporary waterway barrier works must be completely removed at the completion of the dredging activities.	At the completion of the dredging activities.
7	In-stream works are to be completed as quickly as possible, but must be avoided during times of elevated flows.	At all times



**Part D.****Development permit for Operational Works for development in a declared fish habitat area**

This operational works approval is for placement of the dredge material delivery pipeline through the Yorkeys Creek declared fish habitat area. The entity with jurisdiction for conditions in this schedule is the Department of Agriculture and Fisheries.

Condition number	Condition	Timing
1	Development authorised under this approval is limited as follows: <ul style="list-style-type: none"><li>Operational works within the Yorkeys Creek declared Fish Habitat Area, management B area, being limited to the placement of a temporary dredge material delivery pipeline within Thomatis/Richters Creeks.</li></ul>	At all times
2	Works involving the development within a declared Fish Habitat Area must be undertaken in accordance with the Accepted Development Requirements for operational work that is completely or partly within a declared Fish Habitat Area or under a development approval (assessable development).	At all times
3	Development within the declared Fish Habitat Area cannot occur until a Resource Allocation Authority (RAA) under the <i>Fisheries Act 1994</i> is held for the relevant works and the works are consistent with the prescribed development purpose as defined in section 214 of the <i>Fisheries Regulation 2008</i> .	For the duration of the works the subject of this approval.
4	The development works must avoid, or where this cannot be reasonably achieved minimise/mitigate impacts to the declared Fish Habitat Area.	For the duration of the works the subject of this approval
5	The development must maintain tidal or stream hydrology and retains natural drainage and inundation patterns.	For the duration of the works the subject of this approval
6	Where benthic disturbance is necessary, it is to be undertaken in a manner that enables the area to be restored to the pre-disturbance condition and profile.	For the duration of the works the subject of this approval
7	Only those aspects of the development that have a functional requirement to be located on tidal lands creates the requirement to undertake works within the declared Fish Habitat Area.	At all times
8	The development works must be managed to prevent development works and associated activities (storage, parking, runoff, access) from indirectly impacting on the declared Fish Habitat Area.	Prior to commencement of the works and maintained until their completion.

## Appendix 3. Coordinator-General's recommended stated conditions

This appendix includes the Coordinator-General's recommended stated conditions for a State Marine Parks permit under the *Marine Parks Act 2004*, recommended under section 52 of the *State Development and Public Works Organisation Act 1971*.

### Schedule 1. State Marine Parks permit

The Department of Environment and Science is designated as the agency responsible in this schedule.

#### Condition 1. Dredging conditions

- (a) The Permittee must use a suitably experienced dredge contractor when undertaking works in the Marine Parks.
- (b) The Permittee must only conduct dredging activities within the area designated in Attachment A of this permit
- (c) The Permittee must conduct dredging activities in accordance with the approved Environmental Management Plan.
- (d) The Permittee must provide to the Managing Agency in situ calculations of spoil material dredged from the Approved Dredge Area within two (2) months of the completion of each dredging campaign authorised under this permit. The volume calculations must be based on bathymetric surveys undertaken prior to work commencing and following the completion of dredging activities.

#### Condition 2. Environmental management plan

- (a) The Permittee must submit to the Managing Agency for approval an Environmental Management Plan no later than 30 business days prior to the commencement of any works permitted herein which includes but is not limited to the following:
  - (i) the name, contact details and curriculum vitae of the dredge contractor;
  - (ii) the name and contact details of the dredge contractors staff with responsibility for marine mammal and protected reptile observation;
  - (iii) proposed dredge methodologies and types of equipment;
  - (iv) measures taken to avoid or minimise the double handling of dredge material;
  - (v) measures taken to manage turbidity including turbidity monitoring;
  - (vi) control measures and treatments to prevent harm from Potential Acid Sulfate Soils and/or Actual Acid Sulfate Soils;
  - (vii) water quality monitoring plan, and an;
  - (viii) environmental monitoring plan for the term of the permit including surveys of seagrass abundance and distribution adjacent to the Approved Dredge Area.
- (b) The Permittee must not commence any works or operations until the Environmental Management Plan has been approved by the Managing Agency.

- (c) The Permittee must comply with the Environmental Management Plan as approved in writing by the Managing Agency.
- (d) The Permittee must provide a Post Works Report in writing to the Managing Agency, no less than six (6) months following the completion of works.
- (e) The Managing Agency may request the Permittee to make revisions to the Environmental Management Plan, if required to meet the objects of the (Qld) *Marine Park Act 2004*.

**Condition 3. Schedule of works**

- (a) The Permittee must provide a Schedule of Works in writing to the Managing Agency, no less than 10 business days before the proposed commencement of any works.
- (b) The Permittee must not carry out any works until the Schedule of Works has been approved in writing by the Managing Agency.
- (c) The Permittee must implement the Schedule of Works as approved in writing by the Managing Agency.

**Condition 4. Environmental site supervisor**

- (a) When the Permittee is advised by the Managing Agency that environmental site supervision of works is required, the Permittee must:
  - (i) provide the 24-hour contact details of an on-site liaison officer whom the Environmental Site Supervisor can contact; and
  - (ii) ensure that the Environmental Site Supervisor has access to works as and when they require.
- (b) The Environmental Site Supervisor is authorised to stop or suspend or modify works, which has caused or are likely to cause material environmental harm or serious environmental harm
- (c) Where the Environmental Site Supervisor has directed the Permittee to cease works under Condition 4(b), the Permittee must not recommence works unless authorised by the Environmental Site Supervisor.
- (d) Where the Environmental Site Supervisor directs the Permittee to cease works or to modify the works under Condition 4(b), the conduct of the Permittee when complying with the order must be in accordance with:
  - (i) any directions given by the Environmental Site Supervisor; or
  - (ii) the Environmental Management Plan; or
  - (iii) the Schedule of Works.
- (e) The Permittee and its employees, contractors and subcontractors and agents must comply with any reasonable direction given by the Environmental Site Supervisor for the purpose of ensuring compliance with this permit, the Environmental Management Plan or any direction considered necessary by the Environmental Site Supervisor for the conservation, protection and preservation of the Marine Parks and property in the Marine Parks.

**Condition 5. Environmental harm conditions**

- (a) The Permittee must take all reasonable steps to ensure that all permitted operations and works do not cause harm to the environment outside those permitted under this approval.
- (b) The Permittee must notify the Managing Agency if a protected species is found injured or dead within 300 metres of the permitted works no later than 24 hours after the protected

species is found. If works are underway at the time, the Permittee must further ensure that:

- (i) all use of equipment that may have contributed to the injury or death of the protected species ceases immediately;
  - (ii) an assessment is made of the cause of the incident and a notification submitted to the Managing Agency;
  - (iii) additional measures are incorporated into the Environmental Management Plan to minimise the risks identified, and;
  - (iv) any works suspended under (i) does not resume until assessment and notification in item (ii) is complete.
- (c) The Permittee must notify the Managing Agency (within 24 hours) of all incidents. The notification must include:
- (i) details of the incident including date, time, location, cause and nature of the incident;
  - (ii) the name and contact details of the person(s) witnessing, reporting and/or responsible for the incident;
  - (iii) the type, estimated volume and concentration of any pollutants involved;
  - (iv) measures taken or proposed to be taken to manage the impact and the success of those measures in addressing the incident; and
  - (v) details of the incident including any monitoring and reporting that will be undertaken.
- (d) The Permittee must keep a record of all incidents and provide the record for inspection upon request by the Managing Agency. Such record must be kept and made available for the term of the permit.

## **Schedule 2. Maritime Safety**

### **Condition 1. Post-Assessment contact with the Department of Transport and Main Roads - Maritime Safety Queensland and Regional Harbour Master**

Once the proponent has received final approval and wishes to proceed with the project, it must contact the Regional Harbour Master before any works/ shipping starts, to discuss mitigating any shipping safety, traffic and pollution impacts of the project. This includes shipping traffic for the import of any materials for construction. Any management plans or other mitigation measures for these issues required by the Regional Harbour Master and Maritime Safety Queensland must be discussed, prepared and approved as necessary.

### **Condition 2. Maritime infrastructure**

The proponent must implement all impact mitigation measures necessary to avoid adverse impacts on the safety, condition and efficiency of shipping in Queensland waters. Discussions must take place with the Regional Harbour Master to determine any required measures and an Aids to Navigation plan developed and approved if required. A Maritime Infrastructure Agreement may also be required and need approval from the Regional Harbour Master and Maritime Safety Queensland in conjunction with this. Any plans and agreements must be in place and approved before the project begins construction.

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**Condition 3. Maritime safety, traffic and ship-sourced pollution impact assessments**

Discussions must take place with the relevant Regional Harbour Master about maritime safety, traffic and ship-sourced pollution impacts from the project. The following plans must be developed by suitably qualified people to be approved by the relevant Regional Harbour Masters if deemed necessary:

- (a) Marine execution plan
- (b) Vessel traffic management plan
- (c) Aids to navigation management plan
- (d) Ship-sourced pollution prevention management plan.

Any plans and agreements must be in place and approved before the project begins construction.



## Appendix 4. General recommendations

The following recommendations are provided to guide assessment managers in assessing the development applications. These recommendations do not limit assessment managers' ability to seek additional information nor power to impose conditions on any development approval required for the project.

### Schedule 1. Matters of State Environmental Significance (MSES)

The Beach stone-curlew (*Esacus magnirostris*) is a listed threatened species under the *Nature Conservation Act 1992* (NC Act). This general recommendation specifically applies to the management of project impact on the Beach stone-curlew for consideration by the Department of Environment and Science (DES).

- Recommendation 1.** The outcome sought by this recommendation is the development and delivery of a management plan that provides a management framework for avoiding and mitigating impacts of the project on the Beach stone-curlew and its breeding, nesting and foraging habitats (protected species habitat) throughout the project (from pre- to post-construction).
- (a) Prior to commencement of construction, submit to DES for approval, a management plan for the Beach stone-curlew.
  - (b) The management plan must be prepared in accordance with the commitments made in EIS documents and must be consistent with conditions in this Coordinator-General's report.
  - (c) The management plan must be prepared by an appropriately qualified person (s) in consultation with DES and have regard to the best scientific knowledge on the preferred foraging and nesting habitats, breeding timing and behaviours of the Beach stone-curlew.
  - (d) Prior to commencing construction, survey the proposed construction areas to quantify the extent of actual and potential Beach stone-curlew breeding, nesting and foraging habitat that will be impacted by the project. This must include any actual and potential impacts on areas outside the project's footprint.
  - (e) Surveys required by (d) must be:
    - (i) completed by an appropriately qualified person(s)
    - (ii) undertaken during an appropriate time of the year (i.e. when Beach stone-curlew are most active and breeding).
  - (f) Provide the management plan to DES, as soon as practical after the survey but no later than three (3) months prior to any impacts, which identifies, maps and quantifies any foraging and nesting habitat within and adjacent to the pipeline corridor, DMPA, or areas affected by temporary works, that will be directly or indirectly impacted by the project.
  - (g) The management plan must contain details of how management and mitigation strategies would be applied on land, riparian areas and instream in relation to all habitats used by the Beach stone-curlew. An 'avoid, mitigate, offset' framework applies to the project.
  - (h) Works are to be carried out only between March and September each year to avoid impacts during the breeding season of the Beach stone-curlew.
  - (i) If a nest(s) is/are present and actively being used to rear offspring, the following actions must be taken in order of priority:

- (i) Leave the nest undisturbed until the young have fledged naturally.
- (ii) Nests will only be disturbed if there is no practical alternative, and all reasonable attempts to avoid their disturbance have been made. An appropriately qualified person (e.g. licensed spotter/catcher) may carefully remove chicks and/or eggs and place these in the care of a licensed wildlife carer.
- (iii) A species management program (SMP) under the NC Act is required to interfere with a breeding place prior any impacts, including, but not limited to the removal of eggs and/or nests.
- (iv) A damage protection permit (removal and relocation of wildlife; e.g. Beach stone-curlew hatchlings) under the NC Act will be required prior to taking of any wildlife.
- (v) If any significant residual impacts would occur on the prescribed environmental matter, wildlife habitat for the Beach stone-curlew, environmental offsets must be prepared in accordance with the Environmental Offsets Act 2014, Environmental Offsets Regulation 2014 and the Queensland Government Environmental Offsets Policy
- (j) Construction and dredged material placement works must be undertaken only between March and end of September, outside the breeding season of the Beach stone-curlew (as per commitments made in the EIS documents).
- (k) Delivery of the management plan must include engagement of third parties (e.g. adjacent landholders, non-government organisations, research bodies) as the life cycle of the Beach stone-curlew and protection of its habitats may require protection outside the direct impacts of the project.
- (l) The management plan must detail how the local population and habitats for the Beach stone-curlew would be managed during construction and operation of the project.
- (m) This management plan must include but not be limited to: nest protection and management measures such as the exclusion of people associated with the works from nesting areas
- (n) The management plan must not be inconsistent with any SMP and/or damage mitigation permit (if required) for the Beach stone-curlew. A SMP and damage mitigation permit (if required) would be required to be submitted separately to DES under the requirements of the NC Act.
- (o) The management plan must include requirements outlined in Schedule 5.
- (p) Implement the approved management plan during the construction, operation and decommissioning phases of the project.

## Schedule 2. Transport Infrastructure Act

This part is relevant to applications for which the *Transport Infrastructure Act 1994* is applicable. This general recommendation is for consideration by the Department of Transport and Main Roads.

### **Recommendation 2.** Permits, approvals and traffic management plans

- (a) To ensure efficient processing of the project's required transport-related permits and approvals, the proponent must, no later than three (3) months, or such other period agreed in writing with TMR and Cairns Regional Council, prior to the commencement of significant construction works or project-related traffic:
  - (i) obtain all relevant licenses and permits required under the *Transport Infrastructure Act 1994* for any works within the state-controlled road corridor (s33 for road works approval, s62 for approval of location of new or changed vehicular accesses to state roads and s50 for any structures or activities to be located or carried out in a

state-controlled road corridor). For example, consideration will need to be given to the construction of temporary access works on Holloways Beach Road and Yorkeys Knob Road and the provision of traffic controllers to facilitate safe access and egress of the heavy vehicles;

- (ii) prepare a Traffic Management Plan (TMP) in accordance with TMR Cairns District office (and Cairns Regional Council) requirements. The TMP must be prepared and implemented during the construction and commissioning of each site, where works in or near state roads are to be undertaken, for example, when constructing or laying dredge material pipeline crossings under state roads. The TMP should consider road-use at site access points, road intersections or where works are undertaken in state-controlled road corridors;
- (iii) the TMP is also required to confirm haulage vehicle configurations, routes, timing, escort requirements and manoeuvrability through intersections on the state-controlled road network through the TMR permitting process, as listed in Table B14-12 of the July 2017 RDEIS Traffic report;
- (iv) prepare a Heavy Vehicle Haulage Management Plan for any excess-mass or over-dimensional loads for all phases of the project, in consultation with TMR's Cairns District office, the Queensland Police Service and Cairns Regional Council.

**Recommendation 3.** Stormwater/ flooding impacts on state-controlled roads

- (a) In relation to stormwater management and flood immunity, the proponent must further demonstrate that flood storage, flood velocity and water levels (change in flood height) from the Northern Sands DMPA associated with this project will have a no worsening or actionable nuisance to the existing and future state-controlled transport corridors (Captain Cook Highway and Cairns Transport Network Busway).
- (b) Any works on the project site must not:
  - (i) create any new discharge points for stormwater runoff onto the existing and future state-controlled transport infrastructure corridor
  - (ii) interfere with and/or cause damage to the existing stormwater drainage on the existing and future state-controlled transport infrastructure
  - (iii) surcharge any existing culvert or drain on existing and future state-controlled transport infrastructure
  - (iv) reduce the quality of stormwater discharge onto existing and future state-controlled transport infrastructure
- (c) RPEQ certification [with supporting documentation] must be provided to the Department of Transport and Main Roads, confirming that the development has been constructed in accordance with part/s (a) and (b) of this condition.

**Recommendation 4.** Future Public Passenger Transport Corridor (Cairns Transit Network)

- (a) Retain at least a 50 m set back from the Future Public Passenger Transport Corridor to be consistent with conditions for development approval SDA-0117-036724 for Lot 5 on SP245573.

### **Schedule 3. Nature Conservation Act 1992**

The following advice is for consideration by the Department of Environment and Science under the *Nature Conservation Act 1992*.

**Recommendation 5.** Species management program (SMP)

The outcome sought by this recommendation is the development of a SMP to assess the impacts of the project on animal breeding places. A SMP authorises activities that will impact on breeding places of protected animals that are classified as extinct in the wild, endangered,

vulnerable, near threatened, special least concern, colonial breeder or least concern. An SMP is only required where an animal breeding place has been identified and activities are required to tamper with the breeding place in order to complete the scope of works. Animal breeding places include obvious structures such as bird nests and tree hollows, as well as more cryptic places such as amphibian or reptile habitat where breeding takes place.

SMPs do not give authority for a planned activity, such as clearing or removal of habitat (excluding animal breeding places), as these are potentially addressed under other approval systems such as the Planning Act 2016, Vegetation Management Act 1999, or the Protected Plants framework under the NC Act.

SMPs must be prepared and submitted to DES as per the requirements of the NC Act and the 'Information Sheet – Species Management Program requirements for tampering with a protected breeding place' for approval prior to clearing and construction, and demobilisation of the temporary works.

**Recommendation 6.**                      Damage mitigation permit

The outcome sought by this recommendation is to ensure compliance with the requirements of the NC Act in case wildlife (including, but not limited to Beach stone-curlew hatchlings) needs to be removed or relocated as part of the activities. A damage mitigation permit (removal and relocation of wildlife) under the NC Act allows a person to take wildlife in such circumstances.

**Recommendation 7.**                      Protected plants

The outcome sought by this recommendation is to determine the impacts of the project on any identified endangered, vulnerable or near threatened plants (EVNT plants) in the project footprint.

- (a) Compliance with the requirements of the NC Act and the protected plant framework.
- (b) Prior to any clearing, the proponent must check the flora survey trigger map.

**Recommendation 8.**                      Vegetation mapping

The outcome sought by this recommendation is to verify the total impacts of the project on flora and regional ecosystems, including matters of state environmental state significance (MSES) prior to clearing / impacts.

- (a) Prior to clearing of native vegetation, confirm the regional ecosystems present within the site by submitting vegetation maps for verification by the Queensland Herbarium.
- (b) Update the Beach stone-curlew management plan, especially the prescribed environmental matter (protected wildlife habitat for the Beach stone-curlew), and if required, propose offset requirements based on verified mapping.

## Appendix 5. Terms of reference for Technical Advisory Group

The following draft Terms of Reference have been proposed by Ports North. In the conditions for the environmental authorities (Appendix 2) the Department of Environment and Science have specified requirements for the membership of the Technical Advisory Group.

### Introduction

This Terms of Reference sets out the teams, roles and responsibilities for monitoring and management of water quality impacts from TSHD and BHD dredging associated with the CSD project. Based on Chapter C2, Dredge Management Plan (DMP) of the revised EIS, a Technical Advisory Group will be established to oversee the development and implementation of the Reactive Monitoring Program (RMP).

For the purposes of these Terms of Reference, the descriptions of reactive and validation programs described in the Chapter C2, Dredge Management Plan (DMP) of the Revised Draft EIS, are to form portions of the Receiving Environment Monitoring Program referenced within the conditions of the EA for ERA-16 and other approvals that require monitoring of marine ecology or water quality to manage the dredging activity for the project.

### Technical Advisory Group

#### Purpose

The purpose of the Technical Advisory Group is to:

- Provide technical advice to Ports North and regulatory agencies on risk management techniques to minimise the impacts of dredging and marine construction works associated with the CSD Project on the marine ecology of Trinity Inlet/Bay and surrounds.
- Provide input, review and comment to the CSD Project Management Team and Regulatory Oversight Committee on applications for various approvals (especially associated with the Environmental Authority for dredging).
- The Technical Advisory Group will provide science based advice on marine ecological issues to assist in defining and implementing management techniques to ensure the project meets all approval conditions and adopts leading practice during
  - the detailed design phase - including input to applications for various approvals, and
  - the marine construction works (dredging, transport of material and tailwater discharge from placed dredged material).
- Provide independent, expert based input on the scientific basis underlying the REMP and contingency measures in the Dredge Management Plan (DMP).



- Provide independent, expert based input to the application for Environmental Authority in relation to the suitability of water quality triggers for managing the dredging activity.
- Endorse the RMP and contingency measures in the DMP.
- Provide independent oversight of the implementation of the RMP.
- Oversee management and monitoring strategies associated with the dredging and marine construction works to address conditions associated with regulatory agency marine environmental permits and approvals. These will include baseline data collection, monitoring program design, and identification of specific monitoring indicators to identify changes to coastal ecosystems.
- Oversee implementation of the Reactive Monitoring Programs (RMPs), with appropriate triggers and corrective actions, designed to avoid or minimise impacts. These include including Capital Dredging RMPs (relating to dredge plumes and seagrass) and Tailwater Management RMPs (relating to the release of tailwater and groundwater influences associated with the Barron River DMPA).
- Validation Monitoring Programs (VMPs) designed to confirm EIS predictions. These include a Capital Dredge Plume VMP to valid dredge plume source assumptions underlying marine water quality impact assessments, a Biological VMP (based on a Before-After-Control-Impact design) to validate impact predictions for soft sediment benthic invertebrates, seagrass and reef habitats and a Tailwater Management VMP to validate modelled predictions for tailwater and groundwater influences associated with the Barron River DMPA.
- Monitor the effectiveness of implementation of the environmental management plans associated with the dredging and marine construction works including the Dredge Management Plan and Construction Environmental Management Plan, and recommend where that corrective actions needed be implemented.
- Review environmental performance of the dredging against criteria and triggers and evaluate corrective actions.
- Communicate monitoring results to stakeholders through the Ports North Communication and Liaison Team.

### Likely membership

It is expected that the Technical Advisory Group will be made up of:

- Independent Chair
- Secretariat
- Technical Advisors - recognised specialists in particular environmental fields
- Recognised specialist in dredging
- Port of Cairns Technical Advisory Consultative Committee (TACC) representatives as required.
- Ports North CSDP Project Manager
- Ports North Environment Manager

The advisory panel would also be supported as required by individuals with expertise on mega fauna, corals, monitoring and statistics.

Potential nominations for Chair will be identified by Ports North for election by members of the Technical Advisory Group, and ratified by the CSD Project Management Team. State and Federal Governments will have veto over the appointment of independent Technical Advisors listed at 2.4.3. The secretariat will be provided by Ports North.

Regulators and the Chair of the Ports North Maintenance Dredging TACC have a standing invitation to attend Technical Advisory Group meetings.

The Technical Advisory Group may extend an invitation for attendance of other representatives for specific meetings by a majority vote.

### Scope of Work (prior to and during dredging)

The scope of work for the Technical Advisory Group is to be reviewed and finalised by the Technical Advisory Group at its first meeting.

However, it is anticipated that the scope of work for the Technical Advisory Group will involve:

- Prior to the application for Environmental Authority (and commencement of dredging):
  - Provide independent expert input into the preparation of the RMP and contingency measures in the DMP, including:
    - Review and comment on the scope of work for the Technical Advisors in relation to ecological surveys, setting of water quality triggers and ecological health indicators, and preparation of the RMP and DMP.
    - Critically review and comment on the RMP and contingency measures in the DMP, including the monitoring trigger levels and indicators that have been set.
    - Advise on appropriate trigger levels for inclusion in the Environmental Authority application.
  - Approve the final RMP and DMP for implementation.
- During Dredging:
  - Receive fortnightly updates on monitoring from the Technical Advisors and any mitigation responses to level 1 triggers.
  - In the event that level 2 water quality triggers are exceeded, provide real-time advice to Ports North on biological response triggers and mitigation measures.
  - In the event that level 3 water quality triggers are exceeded, provided real-time advice to Ports North on whether dredging should be suspended.
  - Receive, investigate and respond to any complaints or incidents relating to TSHD dredging.
  - Advise on whether ongoing monitoring of mechanical (BHD) dredging is required.
- On completion of dredging:
  - Critically review monitoring results and mitigation measures.
  - Provide a formal report to Ports North.

## Specific Roles

### Independent Chair

The Independent Chair will need to have the following characteristics:

- A working knowledge of water quality
- A good understanding of marine ecosystem health
- Experience with facilitating groups of this nature

Roles and responsibilities for the independent chair will include:

- Determining meeting dates
- Setting the agenda for meetings
- Putting budgets to the secretariat
- Facilitating meetings in an orderly manner, ensuring that Technical Advisory Group members and observers behave respectfully and constructively.
- Reviewing incoming correspondence
- Drafting correspondence on behalf of, and in consultation with the Technical Advisory Group.
- Finalising correspondence taking Technical Advisory Group comments into account
- Providing final correspondence to the Secretariat for mailing and posting on website
- On advice from the Technical Advisory Group, or in the event of a serious complaint, advising Ports North about mitigation actions, including whether dredging should be halted.

### Secretariat

Roles and responsibilities for the secretariat (Ports North) will include:

- Taking notes during meetings and draft meeting minutes and action lists
- Coordinating incoming and outgoing mail, and forwarding incoming mail to the Chair.
- Organising meeting venue (Ports North office), refreshments and other requirements for Technical Advisory Group meetings.
- Distributing information to members on behalf of the Chair
- Maintaining attendance records, minutes, and correspondence
- Posting information on website on behalf of the Chair
- Distributing minutes of past meetings, agenda and items for review and discussion to members at least two weeks before each scheduled meeting
- Handling logistical issues such as transport, expense claims and payments
- Submitting Technical Advisory Group budget to Ports North for approval
- Managing the budget for the Technical Advisory Group.

## **Technical Advisors**

Technical advisors will be recruited, and included at meetings when required, to provide expertise in the following areas:

- Water quality:
  - Water quality objectives
  - Water quality monitoring approaches, including acute ecosystem health indicators
- Coral reef ecosystems
- Seagrass ecosystems
- Marine megafauna, including underwater noise.

Technical advisers should have experience with turbidity-related impacts.

Their role will be to provide expert technical input as directed by the Chair, and in accordance with the objectives of the Technical Advisory Group.

## **Dredging operations specialist**

The dredging operations specialist will have experience in dredge (TSHD and BHD) operation, and will:

- provide input on water quality contingency measures for the respective dredge operations,
- In the event of trigger levels being reached, provide advice on appropriate responses.

## **Term of Panel**

Membership will be for approximately 2 years (12 months before dredging works, the period of dredging activity and construction, and for 6 months following project completion).

## **Conflict of Interest**

All members of the Technical Advisory Group will be required to declare all existing or potential conflicts of interest to the CSD Project Management Team prior to accepting membership of the Technical Advisory Group. Members will provide updates on any arising conflicts to the Chair as appropriate during their period of appointment.

## **Attendance at Meetings**

Attendance is required by all panel members unless agreed with the Chair of the Technical Advisory Group based on consideration of the current agenda and issues. When a proxy is required the member is to inform the Chair that they are unable to attend the meeting and that their nominated proxy will need to attend. It is the responsibility of the member to ensure that the proxy is provided with a briefing on the meeting and any documentation that will be needed.

## Agenda

The Chair will call for agenda items at least two weeks before the proposed meeting date. This will advise of the proposed meeting date, time and location.

The Chair will collate agenda items and circulate an agenda one week before the meeting date.

## Reporting

Minutes will be taken of all meetings and, following signoff by the Chair, will be reported to the CSD Project Management Group, Regulatory Oversight Committee and TACC within 48 hrs of the Panel meeting. Minutes will be provided on the Ports North website within 72 hrs of the Panel meeting.

Any decision of the Panel that is inconsistent with the advice of an independent expert member will be reported to the Regulatory Oversight Committee and TACC noting the basis for the dissenting view.

## Meeting Frequency

Meetings (in person or electronically) will be initiated one year prior to dredging and occur approximately every 2-3 months until dredging commences (the meeting frequency to be confirmed by the EAP). Weekly meetings will be held during dredging works unless the Panel considers monitoring results indicate the need for more frequent meetings (recognising the potential for more frequent electronic communication as required).

## Post-project Report

On completion of post-construction monitoring, the Technical Advisory Group will prepare a report that provides an overview of the monitoring, identifies any residual detectable environmental effects from the marine project works that may require further consideration and makes recommendations for future dredging within Trinity Inlet and Trinity Bay by Ports North.

## Indicative Expert Advisory Panel Schedule – Dredging

An indicative schedule for the Technical Advisory Group for the Dredging is provided in Table 1 below.

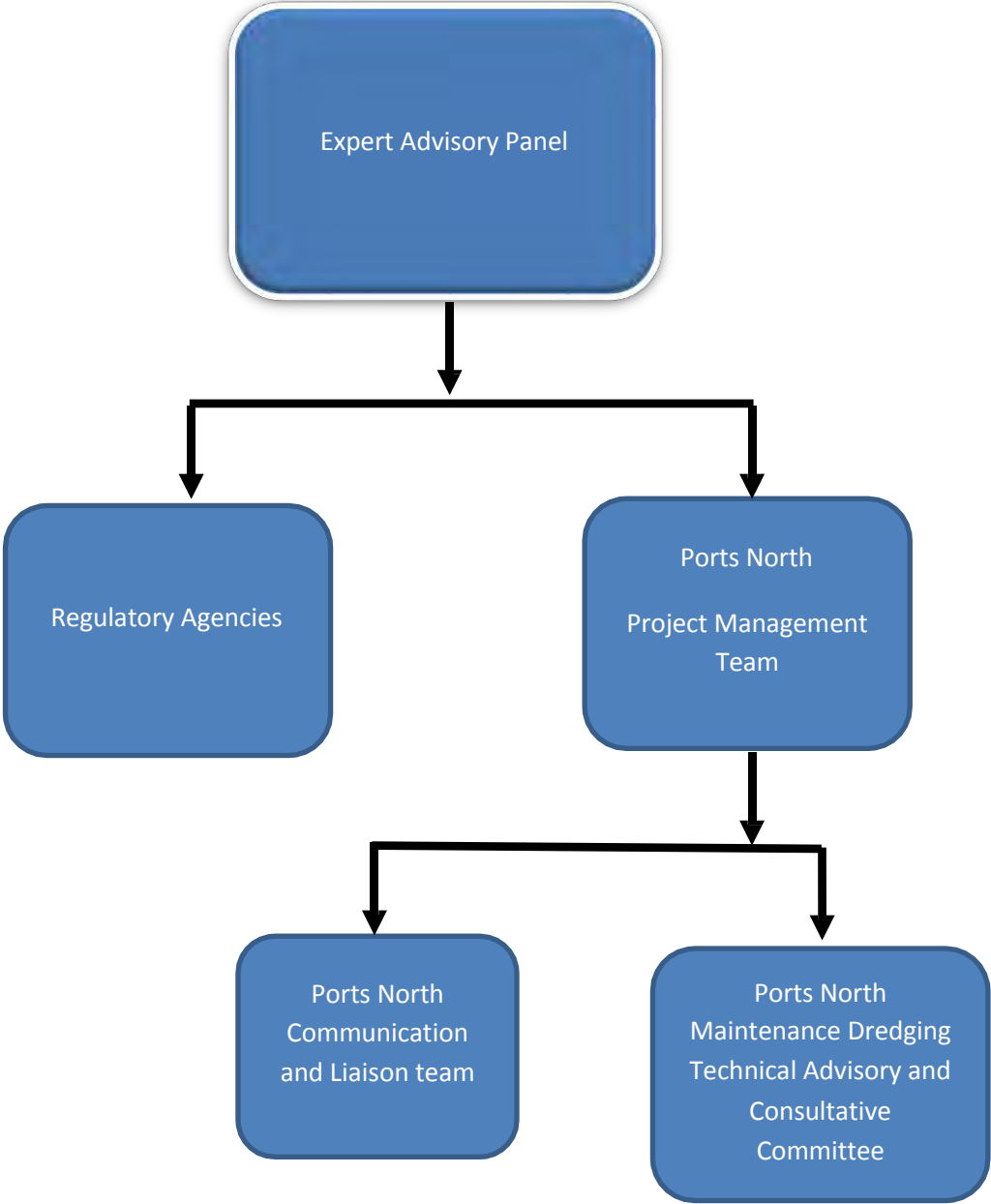
**Table 1 – Indicative Schedule**

Activity	Timing	Tasks
Pre-project Commencement	12 months before dredging	Introductions Confirm and approve TAG membership CSDP project overview Confirm Terms of Reference with State and Commonwealth agencies Confirm TAG operating protocols



Activity	Timing	Tasks
		<p>Overview of (relevant) CGER and other project documentation</p> <p>Work program for Technical Advisory Group</p> <p>Discuss RMP and DMP requirements</p>
Offline review	3 months before dredging	<p>Review 1<sup>st</sup> draft RMP and DMP (contingency measures)</p> <p>Provide comment to Chair</p> <p>Confirm scope, communication and reporting protocols</p> <p>Develop draft Reactive Monitoring Programs and Validation Monitoring Programs (techniques, indicators and locations)</p> <p>Review interim threshold values for monitoring actions</p>
Meeting 2	2 months before dredging	Agree on requirements for final draft RMP and DMP
Pre-dredge monitoring		<p>Confirm deployment of monitoring equipment</p> <p>Update marine ecological risk assessment</p> <p>Review equipment reliability and data management validation</p> <p>Refine Reactive and Validation Monitoring Programs design thresholds</p> <p>Finalise Reactive Monitoring Programs, Validation Monitoring Programs, CEMP and DMP in conjunction with regulators</p>
Commencement of dredging		<p>Implementation of Reactive Monitoring Programs</p> <p>Implementation of Validation Monitoring Programs – plume model</p>
Offline reviews	Fortnightly during dredging	<p>Review monitoring data from RMP</p> <p>Provide feedback to Chair</p>
Meeting 3	Midway during dredging	<p>Discuss implementation of RMP and contingency measures in DMP</p> <p>Make recommendations for adjustments as appropriate</p>
Completion of dredging		
Meeting 4	3 months after completion of dredging	<p>Review monitoring results from RMP</p> <p>Prepare post-dredging reports to Ports North</p>
Post Dredge Monitoring		Complete Impact Validation Monitoring Programs

Indicative Reporting Structure



## Appendix 6. Proponent commitments

I expect the proponent to implement all commitments, management measures and corrective actions listed below and detailed in the EIS documentation.

Note: any references to plans, guidelines and standards should be taken to mean a reference to the most recent equivalent plan, guidelines or standard in the event that the referenced document is superseded.

Commitment number	Proponent Commitment
<b>Northern Sands specific commitments</b>	
1.	<p>The first development application for the Cairns Shipping Development Project relating to the part of the project associated with the Northern Sands Dredge Material Placement Area is required to be the Material Change of Use application for Environmentally Relevant Activity – Dredging [Concurrence ERA 16 (1) (d) – assessable under the <i>Planning Regulation</i>] and the Material Change of Use application for an Undefined Use (assessable under CairnsPlan 2016). The two assessable components are to be lodged as a single application for a Material Change of Use.</p> <p>Note: The lodgement of a single application for Material Change of Use allows for the coordinated consideration of the project and to avoid inconsistent and/or conflicting conditions.</p> <p>Note: This applies to only the applications compartmentalised within the Coordinator General's Evaluation Report or applications that are within the assessment jurisdiction of the Local Government. Downstream applications that are neither compartmentalised nor within the assessment jurisdiction of the Local Government are not subject to this commitment.</p>
2.	<p>If any application associated with the Cairns Shipping Development Project triggers the provisions of section 48 of the Planning Act, the proponent will:</p> <ul style="list-style-type: none"> <li>(a) Make a formal request to the Minister for Planning that Cairns Regional Council be the assessment manager for the parts of the development that would ordinarily be within the assessment jurisdiction of Cairns Regional Council, being the extent that is located within Cairns Regional Council's Planning Scheme area and Local Government tidal area; and</li> <li>(b) Invite Cairns Regional Council to provide a letter of support to the request (Proponent Commitment Number 2(a)).</li> </ul>
3.	<p>The proponent will convene a Technical Advisory Group (TAG) to guide future implementation of the Cairns Shipping Development Project. Membership of the TAG must include, but not necessarily be limited to, representatives who are suitably qualified and experienced in the preparation of:</p> <ul style="list-style-type: none"> <li>(a) Water quality (surface and groundwater) assessments and monitoring programs;</li> <li>(b) Dredge management plans; and</li> <li>(c) Acid sulfate soils management plans.</li> </ul>

Commitment number	Proponent Commitment
4.	<p>Prior to the lodgement of the application referred to in Proponent Commitment Number 1, in accordance with the specification of Proponent Commitment Number 1, the Proponent will provide copies of the following plans, drawings and/or reports to Cairns Regional Council for review:</p> <ul style="list-style-type: none"> <li>(a) Hydrographic and site survey;</li> <li>(b) Groundwater assessment and management plan;</li> <li>(c) Surface water assessment and management plan;</li> <li>(d) Receiving environment management plan;</li> <li>(e) Site water and material balance assessment (including continuous simulation model);</li> <li>(f) Sensitivity analyses;</li> <li>(g) Contingency planning;</li> <li>(h) Flood risk assessment;</li> <li>(i) Dam safety assessment (including Category consequence assessment and Failure impact assessment);</li> <li>(j) Acid sulfate soils management plan;</li> <li>(k) Dredge management plan; and</li> <li>(l) Rehabilitation / final landform plan; and</li> <li>(m) Site based management plan.</li> </ul> <p>Note: all listed plans, drawings and/or reports are required to be prepared in accordance with any identified requirements for their preparation, as detailed within a relevant condition of the Coordinator Generals Evaluation Report for the Cairns Shipping Development Project.</p>
5.	<p>Prior to the lodgement of the application referred to in Proponent Commitment Number 1 the plans, drawings and/or reports required to be provided to Cairns Regional Council, in accordance with Proponent Commitment Number 4, are required to be endorsed as being satisfactory to the Chief Executive Officer of Cairns Regional Council.</p>
6.	<p>Prior to the lodgement of the application referred to in Proponent Commitment Number 1, the proponent will:</p> <ul style="list-style-type: none"> <li>(a) engage a suitably qualified and experienced person who is not associated with any contractual arrangements for the Cairns Shipping Development Project or other activities on the Northern Sands site to: <ul style="list-style-type: none"> <li>(i) Prepare a report that identifies any conflicts between the Cairns Shipping Development Project and the existing land use(s) and approvals at Northern Sands, including but not limited to conflicts with existing plans (e.g. rehabilitation plans) or conditions;</li> <li>(ii) Provide recommendations to rectify any identified conflicts between the Cairns Shipping Development Project and the existing land use(s) and approvals at Northern Sands.</li> </ul> </li> <li>(b) Undertake the recommended actions required to rectify any identified conflicts.</li> </ul>

Commitment number	Proponent Commitment
7.	Prior to the lodgement of the application referred to in Proponent Commitment Number 1 and following the completion of the hydrographic survey specified within Proponent Commitment Number 4 the proponent is required to prepare and submit to Cairns Regional Council an assessment of the Acid sulfate soils risk on the placed or otherwise present materials within the Northern Sands Dredge Material Placement Area. The assessment is required to be undertaken by a suitably qualified and experienced person.
8.	<p>The application referred to in Proponent Commitment Number 1 must be accompanied by:</p> <ul style="list-style-type: none"> <li>(a) A complete drawing package, at appropriate scales and including cross sections and elevations where necessary, detailing: <ul style="list-style-type: none"> <li>(ii) all dredge and disposal locations;</li> <li>(iii) location of all transportation, delivery and discharge pipelines and associated infrastructure and works;</li> <li>(iv) environmental receptors;</li> <li>(v) discharge points;</li> <li>(vi) monitoring locations; and</li> <li>(vii) all engineered structures and other site infrastructure;</li> </ul> </li> <li>(b) A complete drawing package, at appropriate scales, detailing all existing site development including but not limited to land uses, infrastructure, plant and engineered structures;</li> <li>(c) A Visual impact assessment if the height of the bund exceeds 7.5m AHD;</li> <li>(d) A detailed assessment against all statutory assessment criteria;</li> <li>(e) A sequencing plan for the construction, operation and dismantling of the site, including changes to site infrastructure and layout over the major stages of the project (including construction, dredge material placement, settlement, bund removal and the proposed final site layout); and</li> <li>(f) Clear spatial delineation of areas of responsibility (if necessary).</li> </ul>
9.	Following the completion of the required hydrographic survey and prior to the commencement of activities associated with the Cairns Shipping Development Project, if any additional material is disposed of within the Northern Sands Dredge Material Placement area, a revised hydrographic survey and revised Acid sulfate soils risk assessment will be required to be prepared to the satisfaction of the Chief Executive Officer of Cairns Regional Council.
10.	The application referred to in Proponent Commitment Number 1 must be accompanied by evidence of the consent of all land owners who are identified as being potentially adversely impacted by either potential flood or groundwater impacts, which consent must evidence the landowners' acceptance of such impacts. The proponent shall provide each impacted land owner with relevant plans and/or documents which specify the extent of impact on the relevant land.



Commitment number	Proponent Commitment
11.	At all times the proponent will not unreasonably impede public access to public spaces, including but not limited to the foreshore at Yorkey's Beach, Holloways Beach, Richters Creek, including the mouth of Richters Creek and the Barron River.
12.	<p>In conjunction with the lodgement of the application referred to in Proponent Commitment Number 1, the Proponent will provide written notice signed by the Proponent and the Land Owner of Northern Sands that:</p> <p>(a) the placement of dredge material within the Northern Sands Dredge Material Placement Area in conjunction with the Cairns Shipping Development Project will not commence until such time that all other activities within the Northern Sands Dredge Material Placement Area have ceased;</p> <p>(b) the placement of dredge material within the Northern Sands Dredge Material Placement Area in conjunction with the Cairns Shipping Development Project will cease (in accordance with the requirements of the conditions of approval) prior to the commencement or recommencement of any other activity or land use within the Northern Sands Dredge Material Placement Area.</p>
<b>Land</b>	
13.	Conduct ongoing and timely communications with relevant state and local government authorities, business operators, port tenants, residents, and the boating community regarding the potential impacts, including disruption to commercial operations, recreational activities, and traffic conditions.
14.	Adopt a minimum setback from the perimeter of Tingira Street DMPA and a batter profile to achieve the required factor of safety against instability.
15.	Conduct community engagement to inform the public of the pipeline works, prepare them for the short-term intrusion, and outline the proposed restoration measures and timeframes.
16.	Investigate properties affected by Landside works identified on the EMR to determine if contaminants exist, prior to undertaking any development. Chapter C1 Construction EMP, includes proposed appropriate environmental and human health mitigation and management measures which will be developed as part of Operational Works applications and managed during the construction phase of the project through inclusion of relevant provisions for management of contaminated land in the Construction EMP and appointed Contractors EMP.
<b>Nature conservation areas</b>	
17.	Implement measures related to limiting water quality impacts from TSHD dredging and tailwater discharge into the Barron River.
18.	Conduct reactive monitoring programs for water quality and seagrass as well as tailwater and groundwater impacts from placement at the Northern Sands DMPA.
19.	Convene a Technical Advisory Group to oversee the reactive monitoring program and setting water quality, groundwater and ecological trigger values.
20.	Undertake validation monitoring programs for seagrass, corals, dredge plumes and other impact predictions from the Final EIS.

Commitment number	Proponent Commitment
21.	Seek an approval of a Fish Habitat Area 'exchange' to accommodate a 7.98 ha encroachment of proposed channel widening into the FHA area.
<b>Coastal processes</b>	
22.	Direct the dredge contractor to regularly inspect the dredge delivery pipeline at Richters Creek and manually bypass excessive build-up of beach sand material from one side of the pipeline to the other to maintain coastal processes, should it be necessary.
23.	Ensure that consideration is given to the relocation of the maintenance DMPA to the Option 1A area (as identified in the Original Draft EIS), as part of the application for, and resolution of, the future Marine Park and Sea Dumping Permits (required in 2020) with consultation with the Technical Advisory Consultative Committee (TACC) and the GBRMPA.
<b>Marine sediment quality</b>	
24.	Develop and implement appropriate fuel handling and spill response procedures in the Port's operational procedures to minimise the potential future risk to sediment quality from refuelling activities associated with the future provision of IFO at the port.
<b>Marine water quality</b>	
25.	Develop and implement a reactive water quality monitoring program for the project.
26.	Monitor the influence of any beach face instability to ensure that the integrity of the pipeline is not compromise while the pipeline is in place.
27.	Monitor for any bathymetric changes and identify any sediment accumulation at the pipeline within offshore areas.
28.	Develop appropriate management controls to ensure that tailwater discharge complies with specified water quality criteria.
29.	Ensure implementation of the Megafauna Management Strategy provided in the Dredge Management Plan (Chapter C2)
30.	Validate the dredge modelling at the beginning of the dredge campaign under different wave and tidal conditions. This will input to the proposed Reactive Monitoring Program for capital dredging to be refined in conjunction with the Expert Advisory Panel.
<b>Water resources</b>	
31.	Conduct geotechnical investigations along the alignment of the wall to identify unsuitable foundation materials for the wall, engineering design to take into account foundation materials, and supervise construction to ensure that the construction is adapted where necessary to ground conditions encountered on site.
32.	Confirm outfall scour protection requirements for the Northern Sands DMPA tailwater discharge pipe and prepare relevant rehabilitation plans for the discharge outfall during the detailed design phase of the project.
33.	Ensure that water level in the lake is managed, as far as practical, whilst maintaining tail water quality, until sufficient dredged material has been placed in the lake to create a low permeability barrier between the saline water in the lake, and sub-surface sand layer of the surrounding aquifer.

Commitment number	Proponent Commitment
34.	Monitor groundwater salinity within and outside the predicted extent of the saline plume prior to, during, and after placement of dredge material at the Northern Sands DMPA.
35.	<p>Commit to manage potential impacts to groundwater quality, sugarcane and groundwater-associated surface ecological systems by undertaking any combination of the following as required:</p> <ul style="list-style-type: none"> <li>• minimising pressure on groundwater from the lake by adjusting dredge placement and discharge water regimes</li> <li>• temporarily reducing pressure on groundwater from the lake by delaying dredging or prolonging dredging cycles</li> <li>• intercepting saline groundwater via sheet piling or dewatering</li> <li>• make good agreements with affected land owners.</li> <li>• rehabilitate surface ecological systems affected by groundwater impacts.</li> </ul> <p>Confirm the likelihood of groundwater salinity impacts on sugarcane root zone, by:</p> <ul style="list-style-type: none"> <li>• investigating the depth of the root zone for existing sugarcane</li> <li>• modelling the vertical extent of increased salinity without mitigation.</li> </ul>
36.	Collect baseline groundwater data to further develop appropriate trigger levels for the groundwater monitoring program
37.	Include closure reporting and hand over testing in a detailed Acid Sulfate Soil Management Plan in accordance with Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines. Ports North will undertake sampling and testing all material placed above -1m below permanent ground water and management of this material as per the ASSMP.
38.	Place any untreated dredge material at least one metre below the permanent ground water level and initially place designated PASS material in the lowest sections of the DMPA void.
<b>Flooding</b>	
39.	Progressively remove the Northern Sands DMPA bund towards the final level RL 3.5m AHD based on the actual settlement and consolidation achieved and assessment of the potential of resuspension during flooding, prior to each wet season.
<b>Marine ecology</b>	
40.	Conduct seagrass surveys within the channel expansion footprint area that is outside of Ports North's current marine Plant Permit Area prior to capital dredging to confirm whether there are any potential direct impacts on seagrass.
41.	Conduct bathymetric surveys of the channel and surrounds progressively and upon completion of dredging to minimise over-dredging and confirm final depths at the completion of the capital dredging campaign.
42.	Conduct a post dredging seagrass monitoring program (and soft sediment benthos monitoring) to identify any changes to communities as a result of the capital dredging program.

Commitment number	Proponent Commitment
43.	Ensure that capital dredging will not be carried out in late spring and summer (November to February) to minimise potential impacts on marine ecological system functions.
44.	Ensure TSHD sailing routes be optimised to minimise the generation of propeller wash
45.	<p>Ensure appropriate megafauna management measures are adopted including the following:</p> <ul style="list-style-type: none"> <li>• ensuring that vessel masters and spotters are adequately trained in marine mammal and marine turtle interaction procedures</li> <li>• maintaining a 300 m exclusion zone between the vessel and marine mammals, when they are sighted. In the event that a marine mammal is sighted, vessel speed and direction will be adjusted until the animal has moved further than 300 m or have not been sighted for 15 minutes</li> <li>• mounting turtle deflectors or chains on the draghead of the TSHD</li> <li>• activating water jets on the draghead before the dredge pump is started, where practicable</li> <li>• starting the dredge pump only when the draghead is close to the seafloor, and stopping the dredge pump as soon as possible after completing dredging</li> <li>• maintaining a lookout for marine wildlife while the dredge operates.</li> </ul>
46.	<p>Ensure appropriate pile driving procedures are implemented to mitigate acoustic impacts on megafauna including consideration of the following:</p> <ul style="list-style-type: none"> <li>• using a resilient pad (dolly) where feasible between the pile and hammer head to attenuate noise</li> <li>• adopting a 'soft-start' regime at the start of each day's piling activities to encourage wildlife to move away from the area</li> <li>• implementing a marine mammal observation zone of one kilometre and an exclusion zone of 100 m during piling activities</li> <li>• stopping piling activities if marine mammals are spotted within or approaching the exclusion zone</li> <li>• use low wattage and/or directional light fixtures to ensure that potential impacts from artificial lighting are minimised.</li> </ul>
47.	Engage with the Technical Advisory Group to determine the need for conduct of surveys, and the detailed management measures to be included in the DMP.
<b>Terrestrial ecology</b>	
48.	Conduct a weed monitoring program to record the abundance of the weed species within the Northern Sands DMPA project area and Tingira Street DMPA; should the monitoring record an increase in abundance or spread of the key weed species, this should trigger the requirement for a weed control program.
49.	Undertake pre-clearance surveys within the dredge delivery pipeline corridor to confirm the number of ant plants to be transplanted.
50.	Ensure that any <i>M. beccarii</i> (Ant plant) individuals that are to be directly impacted by pipeline installation and decommissioning works are translocated to suitable nearby habitat and monitored to determine success of translocation.

Commitment number	Proponent Commitment
51.	Ensure any new fences should have a plain wire as a top strand, rather than barbed wire to reduce the risk of entanglement to minimise impacts on <i>P. conspicillatus</i> (Spectacled flying fox).
52.	Complete night works at the Northern Sands DMPA outside of the spectacled flying-foxes' breeding season (spring–summer) where practicable.
53.	Ensure that the threat abatement actions listed in the DEHP SPRING database will be implemented, should <i>E. magnirostris</i> (Beach stone-curlew) be recorded as breeding at the Richters Creek mouth area.
54.	Construct the segment of the dredge delivery pipeline at Richters Creek mouth outside of the Beach stone-curlew's breeding season (September to February).
55.	Assess the impacts of the final detailed design of the delivery pipeline on the 'fisheries value' of the Melaleuca wetland at Richters Creek mouth and if necessary provide offsets pursuant to the <i>Environmental Offsets Act 2014</i> .
56.	Rehabilitate vegetation cleared to construct the dredge delivery pipeline once the pipeline is decommissioned.
57.	Refine the dredge delivery pipeline alignment to avoid or minimise impacts to protected vegetation.
58.	Develop and implement an appropriate Erosion and Sediment Control Plan and a storm water management plan for Tingira Street DMPA
<b>Socio economic</b>	
59.	Ensure that where feasible, construction plant, materials & machinery should be screened behind fencing or located to minimise visual impacts on adjacent public and residential areas.
60.	Use Appropriate site security, fencing and signage to mitigate any threats to public safety and wellbeing from pipeline construction/dismantling and dredging operations.
61.	Consult with the Holloways Beach Environmental Education Centre to ascertain their peak usage times and activities and to inform details of the dredging and pipeline works and monitoring.
62.	Liaise with the Holloways Beach Environmental Education Centre to enhance the potential for future involvement of the centre in learning and monitoring opportunities
63.	Erect a 'Submerged Pipeline' sign on the bank of Richters Creek for the period of the pipeline with depth information to mitigate any potential danger to boat users
64.	Compensate affected land owners for any economic impact of the delivery pipeline.
65.	Mitigate as far as possible by available practicable measures predicted temporary environmental impacts on residents, particularly those relating to noise.  Mitigate predicted long term environmental impacts on residents, particularly those relating to air quality, as far as possible by available practicable measures and mandated industry changes to fuel specifications and exhaust scrubbing.



Commitment number	Proponent Commitment
66.	Work with local training organisations to increase the skill base of the local population where relevant.
67.	Continue to work with tourism operators and the local media to ensure accurate information about dredging activities is communicated.
68.	Continue consulting with Port Users - In the lead up to and during dredging activities Ports North will continue to consult with its customers to inform them of upcoming activities and discuss any impact these may have on operations.
69.	Continue consulting with commercial fishers – In the lead up to and during dredging activities Ports North will continue to consult with local commercial fishers so that any issues associated with the dredge program and its interaction with commercial fishers can be identified and addressed early.
70.	Work with its contractors to encourage local employment and supply opportunities – While jobs created by construction and operation of the project are not Ports North employed positions, Ports North recognises it has a role to play in developing employment, training and supply opportunities for local people. As relevant, Ports North will work with its contractors to develop local employment and training opportunities during construction, focusing on skills development for school leavers, women, Indigenous and unemployed/underemployed. During construction and operation, where relevant, Ports North will also encourage the organisation and its contractors to develop strategies to assess capacity and cost-effectiveness of sourcing goods and services from the regional and wider state economy.
<b>Noise</b>	
71.	Avoid backhoe dredging in the immediate vicinity of CityPort during night-time hours.
72.	Consult with users of boat moorings near construction areas within the channel and near the wharf in regard to the potential for noise impacts.
73.	Conduct a detailed noise assessment of: <ul style="list-style-type: none"> <li>• noise emissions from the booster pumps, once the location, size and number of pumps is known</li> <li>• noise emissions from the construction of the pipeline</li> <li>• noise emissions from the pump out facility, whether noise would comply with the construction noise limits and whether additional mitigation measures are required to achieve compliance</li> <li>• noise emissions from the Northern Sands DMPA tailwater pump.</li> </ul>
74.	Limit piling activities to the typical construction hours (6:30 am to 6:30 pm, Monday to Saturday) unless approval is obtained from DEHP/local authority based on “sufficient grounds” to justify construction outside these hours.
75.	Prepare a construction noise and vibration management plan for specific project areas which would include the mitigation measures outlined in the Final EIS

Commitment number	Proponent Commitment
76.	<p>Manage potential construction and operation phase (dredging) noise impacts on sensitive receptors in the vicinity of Trinity Wharf and pipeline/ DMPA infrastructure through the mitigation measures identified in B.10.5.1 and C1.7.3.</p> <p>As part of the contractor procurement and detailed design process, noise impacts (particularly booster pump location and operation) will be reassessed to minimise impacts and ensure compliance with the EPP (Noise). All appropriate mitigation measures will be incorporated within the Construction EMPs and the DMP to ensure compliance with the ERA16 conditions for Noise.</p>
<b>Air</b>	
77.	Ensure that the backhoe dredge and tugs will use marine diesel fuel to minimise particulate emissions.
78.	Conduct a survey of ship fuel consumption and fuel type, whilst berthed at the wharf, including at least cruise ships and tankers to assist in impact prediction modelling and management planning
79.	Conduct a baseline air quality assessment (including cruise shipping at berth and a location representative of the apartments on Wharf Street between Lake and Abbott Streets) and re-run the Air Quality Dispersion Model, including review and revision of construction and operation phase assumptions used in the Revised EIS Air Quality Impact Assessment (Appendix AX) and testing of mitigation measures.
80.	Liaise with Cruise Ship companies, AMSA and DEHP to assist in ensuring compliance with applicable regulations requiring cruise ships to either utilise scrubbers on engines or to use low sulfur fuel, or equivalent means to achieve the required air quality emission standards whilst berthed at the wharf.
81.	Ensure that mobile cranes are to be fitted with Selective Catalytic Reduction emission control technology
82.	Ensure that wharf construction dust management measures are adopted as required to minimise dust generation.
83.	Incorporate all appropriate air quality mitigation measures within the construction phase Contractor's EMPs.
84.	Mitigate any potential air quality impacts at buildings occupied by Australian Maritime Safety Authority, Maritime Safety Queensland, Queensland Police Service (Water Police) and Queensland Parks and Services in the vicinity of the Tingira Street DMPA.
85.	Monitor and minimise, as far as practical, the extent of any soft clays excavated by the backhoe dredger in order to limit the potential for odour impacts from the Tingira Street DMPA.
86.	Potential construction phase air quality impacts on sensitive receptors in the vicinity of Trinity Wharf and pipeline/ DMPA infrastructure will be managed through the mitigation measures identified in Chapter C1 (Construction EMP) and the subordinate Contractors EMP.
<b>Landscape</b>	
87.	Ensure that lighting of compounds and works sites is managed in accordance with a Construction Environmental Management Plan

Commitment number	Proponent Commitment
88.	Ensure that unnecessary high intensity lighting from cruise ships is minimised in consultation with cruise ship operators as, and when, the need arises.
<b>Cultural heritage</b>	
89.	Engage a suitably qualified maritime archaeologist to undertake a review of the hydrographic survey to determine the likelihood or the presence of as-yet-unknown maritime archaeological features and to establish extent of known shipwrecks and prepare a report on the likelihood or the presence of additional wrecks or maritime archaeological features in the development area.
90.	Engage a suitably qualified archaeologist to monitor further works in the vicinity of the Malay Town site, in the vicinity of the original Alligator and Lily Creek mouths, and to address recovery, protection and/or documentation of archaeological artefacts, features and deposits that may be exposed.
91.	Monitor wharf upgrade services installation works in the area south of wharf 6 (Old Malay Town material) by a qualified archaeologist.
92.	Undertake a predevelopment archival recording of wharves.
93.	Undertake additional assessment of to the expected vibration levels that have been modelled once the final construction methodology has been selected.
94.	In order to avoid potential damage to heritage structures, the hammer energy used in pile driving will be managed as far as practical by limiting the drop height relative to the hammer mass.
95.	Undertake a condition survey of the heritage wharf prior to the commencement of construction works should previous condition reports not be sufficient to enable the contractor to monitor works.
96.	Provide construction staff with cultural heritage awareness training to assist with recognising any unrecorded archaeological material when excavating in previously undisturbed areas on land.
97.	Adequately detail the scope of the wharf 6 demolition to demonstrate proposed retained fabric, exposure of the relevant characteristics relating to the heritage significance of the wharf and to facilitate interpretation of the wharf's heritage values.
<b>Aboriginal and Torres Strait Islander cultural heritage</b>	
98.	Prepare Cultural Heritage Management Plans to be developed with the relevant parties.
99.	Maintain an 80 m buffer between the Northern Sands DMPA activities and Thomatis Creek to ensure that potential impacts to the Yirrganydji campsite are avoided
<b>Transport</b>	
100.	Provide a traffic management of the shared pedestrian area at the Cairns Cruise Liner Terminal during heavy pedestrian movements to increase safety and give buses and taxis priority when required.
101.	Manage construction vehicle access to and from Holloways Beach and Yorkeys Knob Road with traffic controllers and temporary pavement widening if required for safe access to the lay down sites.

Commitment number	Proponent Commitment
<b>Waste</b>	
102.	Ensure that construction waste be managed in accordance with best practice management procedures outlined in the Construction Environmental Management Plan.
103.	Continue to liaise with Cruise Ship companies and shipping agents to promote opportunities to improve waste management for cruise ship generated wastes.
104.	Should demand arise for connection to CRC's landside sewerage network, provide information on likely flow volumes, trunk connection points and a network analysis to CRC to aid in the assessment of impacts to their existing infrastructure prior to finalisation of the wharfside sewage connection interface works design
105.	Ensure that Internationally recognised signs (e.g. ISO signage) be used to aid international visitors and crew to meet AMSA and DOAWR requirements
106.	Engage license regulated waste transporters for the management of applicable waste streams.
<b>Greenhouse gases</b>	
107.	Develop a GHG emissions inventory for the construction stage to monitor, report and identify opportunities to reduce emissions in accordance with PN Environmental Management system. Implement reduction strategies as appropriate.
<b>Hazard and risk</b>	
108.	Manage project hazard and risks through implementation of the PN Risk Management and Internal Control Policy and Risk Management Framework.
109.	Follow a safety in design process in accordance with the Australian Safety and Compensation Council's Guidance on the Principles of Safe Design for Work (2006).
110.	Implement Health and Safety Management Plans for all project phases in line with the applicable regulations.
111.	Implement a Traffic Management Plan for construction, operations and decommissioning to reduce risks associated with road transport.
112.	Implement the Vessel Traffic Management Plan (Chapter C3) including the mitigation and management measures designed to reduce impacts from the dredging campaign.
113.	Implement the Maritime Operations Management Plan (Chapter C4) to reduce the potential for negative impacts on the environment, vessel safety and operational efficiency as a result of the changes in maritime operational activities (operational shipping) arising from the project.
114.	Review and revise the current Emergency Management Plan as required to reflect hazards and risks associated with the project prior to the commencement of operations.

Commitment number	Proponent Commitment
115.	Undertake a magnetometer (or similar) survey of the proposed new dredged areas prior to work commencing. This survey will be undertaken by a suitably qualified person experienced in recognising the existence and location of historic marine material from the results of the magnetometer (or similar) survey. Reporting on the results of this survey will provide recommendations for the management of any cultural heritage material that may be found.
<b>Cumulative impacts</b>	
116.	<p>Manage any cumulative impacts through regular auditing and implementation of the following management plans:</p> <ul style="list-style-type: none"> <li>• Construction Environmental Management Plan</li> <li>• Dredge Management Plan</li> <li>• Vessel Transport Management Plan</li> <li>• Maritime Operation Management Plan.</li> </ul>



## Acronyms and abbreviations

Acronym	Definition
ACH Act	<i>Aboriginal Cultural Heritage Act 2003 (Qld)</i>
AEP	Annual exceedance probability
AHD	Australian Height Datum
ARI	Annual recurrence interval
AS	Australian Standard
ASS	Acid sulfate soils
ASSMP	Acid sulfate soils management plan
BHD	Back Hoe Dredge
BICT	Brisbane International Cruise Terminal
BS	British Standard
CALPUFF	California Puff Model
CBD	Central business district
CCA	Consequence category assessment
CCLT	Cairns Cruise Liner Terminal
CEMP	Construction environmental management plan
CH <sub>4</sub>	Methane
CHMP	Cultural heritage management plan
CO	Carbon monoxide
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> -e	Carbon dioxide equivalent
CPM Act	<i>Coastal Protection and Management Act 1995 (Qld)</i>
CRC	Cairns Regional Council
CSEP	Community and stakeholder engagement plan
DAF	Department of Agriculture and Fisheries
DATSIP	Department of Aboriginal and Torres Strait Islander Partnerships
dB	Decibels
DEE	Department of Environment and Energy (Cth)
DES	Department of Environment and Science (including the former Department of Environment and Heritage Protection (DEHP) and Department of National Parks, Sport and Racing (DNPSR))
DMP	Dredge Management Plan
DMPA	Dredge material placement area
DMPAs	Refers to Northern Sands DMPA and Tingira Street DMPA
DNRME	Department of Natural Resources, Mines and Energy (including the former Department of Natural Resources and Mines (DNRM) and Department of Energy and Water Supply (DEWS))
DPB	Discharge point B

Acronym	Definition
DSDMIP	Department of State Development, Manufacturing, Infrastructure and Planning (including the former Department of State Development (DSD) and Department of Infrastructure, Local Government and Planning (DILGP))
DSITI	Department of Science, Information Technology and Innovation
DTMR	Department of Transport and Main Roads
EA	Environmental Authority
EIS	Environmental impact statement
EMS	Environmental management system
EO Act	<i>Environmental Offsets Act 2014</i> (Qld)
EP Act	<i>Environmental Protection Act 1994</i> (Qld)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
EPP (Air)	Environmental Protection Air (Noise) 2008
EPP (Noise)	Environmental Protection Policy (Noise) 2008
EPP (Water)	Environmental Protection Policy (Water) 2009
ERA	Environmentally relevant activity
FHA	Fish habitat area
Fisheries Act	<i>Fisheries Act 1994</i> (Qld)
FNQRP	Far North Queensland Regional Plan
FRA	Flood risk assessment
FTE	Full-time equivalent
GARID	Guideline for the assessment of road impacts of development
GBR	Great Barrier Reef
GBRCMP	Great Barrier Reef Coast Marine Park (Queensland)
GBRMP	Great Barrier Reef Marine Park (Commonwealth)
GBRMP Regulations	<i>Great Barrier Reef Marine Park Regulations 1983</i> (Cth)
GBRMPA	Great Barrier Reef Marine Park Authority
GHG	Greenhouse gas
ha	Hectares
HBEEC	Holloways Beach Environmental Education Centre
HFC	Hydrofluorocarbons
HMAS	Her Majesty's Australian Ship
ICNG	Interim Construction Noise Guideline (Department of Environment & Climate Change NSW)
IFO	Intermediate Fuel Oil
IMO	International Maritime Organization
km	Kilometres
L	Litres
LAP	Local Area Plan

Acronym	Definition
LAT	Lowest astronomical tide
LGA	Local government area
LNG	Liquefied natural gas
LUP	Land use plan
m	Metres
m <sup>2</sup>	Square metres
m <sup>3</sup>	Cubic metres
Marine Parks Act	<i>Marine Parks Act 2004 (Qld)</i>
MCU	Material change of use
mg	Milligrams
mm	Millimetres
MNES	Matters of national environmental significance
MOMP	Maritime operations management plan
MSES	Matters of state environmental significance
MSQ	Maritime Safety Queensland
N	Newtons
N <sub>2</sub> O	Nitrous oxide
NC Act	<i>Nature Conservation Act 1992 (Qld)</i>
NGAD	National Assessment Guidelines for Dredging 2009
NGER Act	<i>National Greenhouse and Energy Reporting Act 2007 (Cth)</i>
NGO	Non-government organisations
NO	Nitrogen monoxide
NO <sub>2</sub>	Nitrogen dioxide
NO <sub>x</sub>	Nitrogen oxides
DNPSR	Department of National Parks, Sport and Racing (now part of the Department of Environment and Science)
NTU	Nephelometric Turbidity Unit
PA	Port Authority
PAR	Photosynthetically Active Radiation
PASS	Potential acid sulfate soils
Planning Act	<i>Planning Act 2016 (Qld)</i>
Planning Regulation	Planning Regulation 2017
PM <sub>10</sub>	Particulate matter with an aerodynamic diameter less than 10 micrometres
PM <sub>2.5</sub>	Particulate matter with an aerodynamic diameter less than 2.5 micrometres
Ports Act	<i>Sustainable Ports Development Act 2015 (Qld)</i>
Ports North	Far North Queensland Ports Corporation, trading as Ports North
ppt	Parts per thousand

Acronym	Definition
PPV	Peak particle velocity
PSU	Practical salinity unit
QH	Queensland Health
RAN	Royal Australian Navy
RBL	Rating background level
RDEIS	Revised draft environmental impact statement
RE	Regional ecosystem
Reef 2050	Reef 2050 Long-Term Sustainability Plan
RHM	Regional harbour master
RMP	Reactive monitoring program
SARA	State assessment and referral agency
SCR	Selective catalytic reduction
SDAP	State Development Assessment Provisions
SDPWO Act	<i>State Development and Public Works Organisation Act 1971 (Qld)</i>
SF <sub>6</sub>	Sulphur hexafluoride
SIA	Social impact assessment
SIMR	Social impact management report
SO <sub>2</sub>	Sulphur dioxide
SPL	Strategic port land
SPP	State Planning Policy 2017
SPRING	Species Recovery Information Gateway
SR	Sensitive receptor
TAG	Technical Advisory Group
TAPM	The Air Pollution Model
TI Act	<i>Transport Infrastructure Act 1994 (Qld)</i>
TMP	Traffic management plan
TOR	Terms of Reference
TSHD	Trailer suction hopper dredge
TSP	Total suspended particulates
TSS	Total suspended solids
VM Act	<i>Vegetation Management Act 1999 (Qld)</i>
VOC	Volatile organic compounds
VTMP	Vessel traffic management plan
WQOs	Water quality objectives
WWII	World War II
µg	Micrograms

## Glossary

Term	Definition
Backhoe dredge	A mechanical dredger, similar to an excavator which is mounted on a barge. It works by dredging the seabed using the bucket at the end of the excavator arm and placing the dredge material into a hopper barge. A backhoe dredge will dredge stiff clays from Trinity Inlet
B-double	A truck which has two turntables: one between the truck and first trailer and one between first and second trailers
Barge	A long flat-bottomed boat for carrying freight on canals and rivers, either under its own power or towed by another. A barge will be used to carry stiff clay to the Tingira Street DMPA
Barge-mounted excavator	Will remove stiff clays from the barge to haulage vehicles for placement at the Tingira Street DMPA
Barge ramps	Located at Tingira Street DMPA where barges will land once filled with stiff clays
Bed levelling	Seabed levelling is a dredging technique used in many ports and harbours. A plough is towed behind a tug along the seabed levelling high spots and ridges, moving the material to nearby low spots.
Berth pockets	Where ships berth at the Port of Cairns
Booster pump stations	A pump station designed to boost the pressure of sediment within a long pipeline to support the delivery of dredge material through the delivery pipeline
Boutique cruise ships	Cruise ships less than 240 m in length
Bund wall	A constructed retaining wall around the Northern Sands DMPA void to prevent inundation or breaches of the void material
Cairns Port DMPA	The existing offshore location for Ports North to place maintenance dredge material
Cairns Wharf Complex	Includes all the structures listed under state heritage place ID: 601790, including Trinity Wharf and associated sheds
Capital dredging	A one-off removal of sediment to expand the shipping channel
Capital dredging and port upgrades	Refers to the activities proposed to be undertaken and assessed in Section 5
Construction	Activities proposed to be undertaken during construction and include capital dredging, placement of dredge material and port upgrades
Crystal swing basin	Existing swing basin
Drag head	A dredge drag head is used by a trailer suction hopper dredge to collect sand from the sea floor
Decommissioning	Removal of project infrastructure following construction phase



Term	Definition
Delivery pipeline	Shortened form of dredge material delivery pipeline, delivers soft clay from the trailer suction hopper dredge to the Northern Sands DMPA
Disassembly of the delivery pipeline	Removal of the dredge delivery pipeline
Discharge pipeline	A tailwater discharge pipeline will remove water that collects on top of the placed dredge material from the Northern Sands DMPA void to the Barron River
Draft EIS proposal	The initial project proposal presented in the draft EIS
Dredge material	Sediment to be removed via dredging and placed at the DMPAs
Dredgers	Refers to the trailer suction hopper dredge and backhoe dredge collectively
Dredging area	Where dredging will occur within the existing Trinity Inlet shipping channel
Dredging contractor	Person responsible for the dredging activity
Dredging works	General description for dredging activity
EIS documentation	Refers to the draft EIS and revised draft EIS documents collectively. However, this term is not used when necessary to compare draft EIS and revised draft EIS information
Inner shipping channel	Area parallel to Trinity Wharf which commences at the channel bend and terminates at the main swing basin
Laydown areas	Construction material laydown areas located along the dredge delivery pipeline
Main swing basin	The existing swing basin used by cruise ships to berth at Trinity Wharf
Maintenance dredging	Sediment to be removed via dredging following completion of the project to maintain the Trinity Inlet shipping channel
Mega class cruise ships	Cruise ships up to 300 m in length
Mid cruise ships	Cruise ships 240 m to 290 m in length
Nitrogen oxides	Refers to nitrogen monoxide and nitrogen dioxide
Northern Sands DMPA	Refers to the proportion of the Northern Sands site that is to be utilised by Ports North under an agreement with the landowner for the purposes of placement of dredge material
Northern Sands DMPA void	The void in which dredge material will be placed located within the existing Northern Sands site across Lot 2 on RP712954 and Lot 5 on SP245573
Northern Sands site	The existing site consisting of Lot 2 on RP712954, Lot 5 on SP245573 and Lot 6 on SP254473 which contains an operating sand quarry and waste disposal facility operated by Northern Sands Pty Ltd
Onshore placement of dredge material	In accordance with the Reef 2050 Long Term Sustainability Plan, all capital dredge material will be removed and placed onshore

Term	Definition
Outer shipping channel	Channel extending into Trinity Bay which commences at the channel bend adjacent to beacon number 20 and terminates at the end of channel
Particulates	Includes PM <sub>2.5</sub> and PM <sub>10</sub> . Particulate matter with an aerodynamic diameter less than 2.5 and 10 micrometres. Particles of 2.5 micrometres (fine particles) can be drawn deep into the lungs, while particles of 10 micrometres (coarse particles) tend to be trapped in the nose and throat
Pipeline segments	How the pipeline will be transported (in segments) to laydown areas prior to being constructed
Plinths	Earth structures used to support the dredge pipeline
Port of Cairns	Located on the western bank of Trinity Inlet, approximately 1 km southeast of the city centre of Cairns in northern Queensland
Pre-construction	Activities to be undertaken to prepare project sites for construction such as establishing project infrastructure
Pump-out facility	The temporary dredge mooring and pump-out facility would be established between 2.7 and 3.7 km offshore from Yorkeys Knob to facilitate pumping of the soft clays
Settlement	The process under which dredge material placed within the Northern Sands DMPA will undergo, following the completion placement
Smiths Creek swing basin	A new swing basin proposed to be established to expand berthing capacity for HMAS Cairns Navy
Southern and northern placement areas	Two placement sites at Tingira Street DMPA on Lot 27 of SP218291
Supplementary information	Information provided in addition to the EIS documentation
The project	Cairns Shipping Development Project
The proponent	Far North Queensland Ports Corporation, trading as Ports North
Thomatis/Richters Creek	Where both rivers converge
Tingira Street DMPA	The site where stiff clay is to be placed on Lot 27 on SP218291
Trailer suction hopper dredge	A self-propelled sea-going dredger equipped with a hopper. Dredging is undertaken via a drag head which is connected to a suction pipe to fill the hopper
Trinity Bay	A large bay in the Coral Sea off the coast of Far North Queensland
Trinity Inlet	An oceanic inlet which serves as the Port of Cairns and includes the existing Trinity Inlet shipping channel
Trinity Inlet shipping channel	Existing shipping channel used to by ships to enter the Port of Cairns
Trinity Wharf	Existing wharf structure located at the Port of Cairns
Wharf upgrades	Upgrade of Wharves 1 to 5 and demolition of part of Wharf 6 to make way for extension to Wharf 5 to accommodate increased shipping in the Port of Cairns

Term	Definition
Zone of influence	Extent of detectable plume, but no predicted ecological impacts
Zone of low to moderate impact	Water quality impacts resulting in predicted sub-lethal impacts to ecological receptors and/or mortality with recovery between 6 months (lower end of range) to 24 months (upper end of range)
Zone of high impact	Water quality impacts resulting in predicted mortality of ecological receptors with recovery time greater than 24 months



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