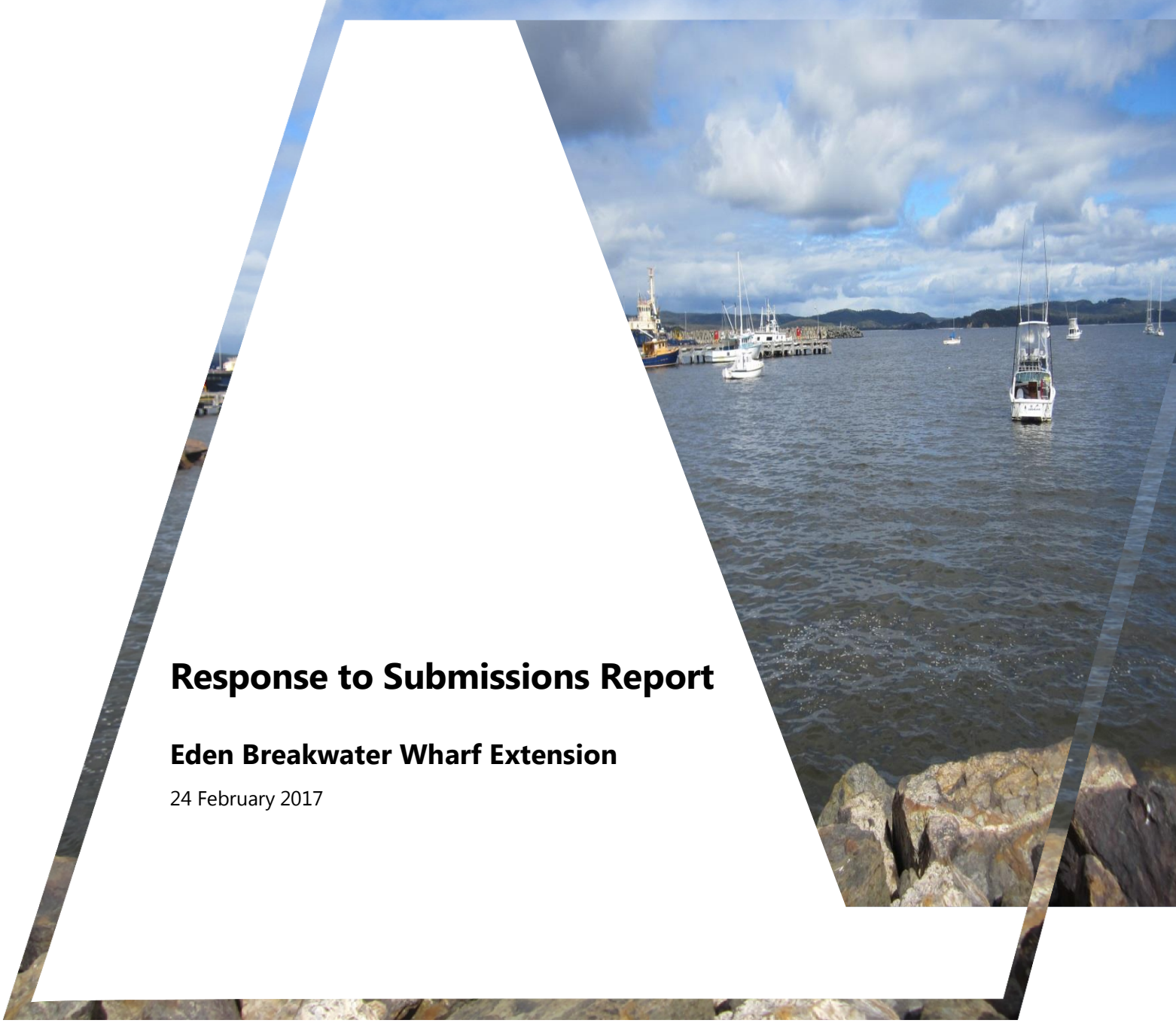

Response to Submissions Report

Eden Breakwater Wharf Extension

24 February 2017

NSW GOVERNMENT Department of Industry Lands

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Synopsis

The Response to Submissions (RTS) Report has been prepared by Advisian to respond to the comments raised in the submissions received during public exhibition of the Environmental Impact Statement for the Eden Breakwater Wharf Extension project (the Project - SSI 16_7734), which is proposed to be carried out by NSW Department of Industry – Lands (the Department). The RTS has been prepared in accordance with Section 115Z(6)(a) of the *Environmental Planning and Assessment Act 1979*.

Disclaimer

Project No: 301311-13734-EN-REP-0009 – Response to Submissions Report: Eden Breakwater Wharf Extension

Rev	Description	Authors	Review	Advisian Approval	Date
A	Issued for client review	C. Jones	S. Mason-Jones	N/A	14.02.17
B	Issued for final client review	C. Jones	S. Mason-Jones	N/A	23.02.17
0	Final	C. Jones	S. Mason-Jones	S. Mason-Jones	24.02.17

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Acronyms

Acronym	Definition
AHD	Australian Height Datum
BHD	Backhoe dredger
BVSC	Bega Valley Shire Council
CEMP	Construction Environmental Management Plan
CD	Chart datum
DI-Lands	Department of Industry – Lands (NSW)
DDA	*Disability Discrimination Act 1992* (Commonwealth)
DSAPT	*Disability Standards for Accessible Public Transport Act 2002* (Commonwealth)
DP&E	Department of Planning and Environment (NSW)
DPI	Department of Primary Industries (NSW)
DoEE	Department of the Environment and Energy (Commonwealth)
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning & Assessment Act 1979* (NSW)
EPA	Environment Protection Authority (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EPL	Environment Protection Licence
HAB	Harmful algal bloom
NSW	New South Wales
NTU	Nephelometric turbidity unit
ODS	Offshore disposal site
OEH	Office of Environment and Heritage (NSW)
OEMP	Operational Environmental Management Plan
OTR	Other than rock (material)
PANSW	Port Authority of New South Wales
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SSI	State Significant Infrastructure
SSIA	State Significant Infrastructure Application
TBT	Tributyltin
TMP	Traffic Management Plan
TSHD	Trailer Suction Hopper Dredger
TSS	Total suspended solids

1 Introduction

Advisian has been commissioned by the NSW Department of Industry – Lands (the Department) to prepare the Response to Submissions report (RTS) for the proposed Eden Breakwater Wharf Extension project (the Project).

1.1 Background

In June 2016, the Department engaged Advisian to prepare an Environmental Impact Statement (EIS) for the Project on their behalf. The EIS was prepared to accompany a State Significant Infrastructure (SSI) Application, submitted to the Minister for Planning pursuant to Part 5.1, Division 2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The EIS was prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) issued on 26 July 2016 pursuant to Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation).

On 26 October 2016, the EIS was submitted to the Department of Planning and Environment (DP&E) for adequacy review. On 2 November 2016, DP&E advised that the EIS was adequate for public exhibition. The EIS was placed on public exhibition from 16 November 2016 to 16 December 2016.

On 28 November 2016, the Project was referred to the Commonwealth Department of the Environment and Energy (DoEE) under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). DoEE issued a request for additional information on 5 January 2017. The Department provided a response to DoEE on 14 February 2017. The application is currently being assessed by the DoEE.

On 28 November 2016, a request was submitted to DoEE for the proposed variation of the existing Sea Dumping Permit (SDP) (No. SD2015/3102) under Section 23 of the *Environment Protection (Sea Dumping) Act 1981*. The application is currently being assessed by the DoEE.

1.2 Document Purpose

The RTS has been prepared under the provisions of Section 115Z(6)(a) of the *EP&A Act* to respond to the comments raised in submissions received by the DP&E during the public exhibition period.

1.3 Document Structure

The RTS is structured as follows:

- Section 2 provides a summary of the total number of submissions and by whom they were made.
- Section 3 provides an update on consultation undertaken since the submission of the EIS to DP&E
- Section 4 provides comprehensive responses to each of the comments raised by regulatory agencies.
- Section 5 provides comprehensive responses to each of the comments raised by organisations and private stakeholders.

- Section 6 identifies the amended or new mitigation measures proposed in the RTS.

Technical specialists have provided additional expert advice during the preparation of this RTS and these are included in Appendix A to Appendix F.

2 Submissions Received

During the public exhibition of the EIS, DP&E received a total of 10 submissions from various stakeholders including:

- Five regulatory agencies.
- Two organisations.
- Three private stakeholders.

There were no objection submissions received for the Project.

DP&E undertook a preliminary assessment of the EIS and identified by letter dated 21 December 2016 a number of matters that required clarification and/ or further information be provided to the satisfaction of DP&E before the SSIA can proceed. DP&E submitted a further information request on 9 February 2017.

The following key issues were identified:

- Details of a formal communication protocol to address unforeseen overnight stays.
- A formal protocol to manage environmental impacts associated with unforeseen overnight stays.
- Total likely vessel movements associated with all dredging options.
- Expected maintenance dredging frequency.
- Results of the detailed dredge plume modelling.
- Confirmation of the water quality trigger value response levels and monitoring.
- Confirmation of the significance of air quality impacts associated with the Project.
- Mitigation measures to ensure dredging does not undermine the existing Breakwater Wharf.
- Plume modelling for all offshore disposal options.
- Plume modelling generated by vessel movements during operation.
- Impacts of sediment plumes on aquatic ecology during operation.
- Further information on lighting impacts.
- Consideration of an alternate construction traffic route.
- Summary of all pre-construction, construction and operational monitoring.
- Long term impact of dredging on adjacent beaches.
- Management of underwater noise during construction.
- Justification for dredging outside standard construction hours.
- Potential for dredging to trigger an algal bloom.
- Monitoring and auditing of management plans.

Detailed responses to these issues are contained in Section 4.

2.1 Regulatory Agencies

In addition to the DP&E's letter of 21 December 2016, the following regulatory agencies provided a submission on the Project EIS:

- NSW Office of Environment and Heritage (OEH) – dated 16 December 2016.
- NSW Environment Protection Authority (EPA) – dated 15 December 2016.
- NSW Department of Primary Industries (DPI) – dated 16 December 2016.
- Transport for NSW (TfNSW) – dated 28 November 2016.
- Bega Valley Shire Council (BVSC) – dated 21 December 2016.

A response to each of the matters raised in the abovementioned submissions is provided in Section 4.

2.2 Organisations

The following organisations provided a submission on the Project EIS:

- Svitzer Australasia – dated 13 December 2016.
- Port of Eden Marina (via Robert Bain) – undated.

A response to each of the matters raised in the abovementioned submissions is provided in Section 5.

2.3 Private Stakeholders

The following private stakeholders provided a submission on the Project EIS:

- Mr Steve Heffernan – dated 15 December 2016.
- Mr Richard Lamacraft – undated.
- Name withheld – undated.

A response to each of the matters raised in the abovementioned submissions is provided in Section 5.

3 Consultation

During preparation of the EIS, a range of consultation activities were undertaken by the Department to inform the community and stakeholders of the Project and to seek their comment and input on the Project. The key consultation activities are documented in Section 7 of the EIS. Consultation with all key stakeholders remains an ongoing process.

Following submission of the EIS for public exhibition, the following consultation activities were carried out for the Project:

- In November 2016, the Department notified the Eden community (post code 2551) of the public exhibition of the EIS and encouraged the community to review the EIS and make a submission, Information on the Project was also available on the Department's website; http://www.crownland.nsw.gov.au/about_crown_land/publications/exhibition_and_information/information/the-eden-breakwater-wharf-extension.

- In late October 2016, the Department of Primary Industries - Food Authority (Food Authority) informed the Department as well as released a media statement, advising of a toxic algal bloom of *Alexandrium fundyense* present in Twofold Bay. The Department sought specialist advice in relation to understanding the potential for the Project to trigger a toxic algal bloom and potential impacts on the local seafood industry. Information on this matter is contained in Section 4. The Department, the Food Authority and Eden Mussel Farms continue to liaise on this matter.

- Consultation with DoEE during the assessment of the EPBC Referral and SDP variation request (refer Section 1.1).

- Consultation with the NSW Aboriginal Land Council (ALC) in January 2017 by letter and email confirming the part-withdrawal of Aboriginal Land Claims 42623 and 42626 and that "*NSWALC consents to the Crown undertaking whatever dredging work is required or ancillary to undertake / advance the Eden Wharf project*". Refer to Appendix A.

- Consultation with the Eden Local Aboriginal Land Council (Eden LALC) in relation to letter submitted to NTSCORP, dated 19 September 2016 as follows:

    - Monday 19th September 2016 – Letter dated 19 September 2016 (Appendix B to the EIS) redirected to Eden LALC.

    - Thursday 13th October 2016 - Met with Eden LALC and Twofold Aboriginal Corporation to discuss Aboriginal Participation and the Native Title Act letter. Verbal acknowledgment of the letter and commitment to respond.

    - Thursday 15th December 2017 - Les Koses unavailable - message left to return call.

    - Wednesday 18th January 2017 - Called - no response, left a message to return call.

    - Thursday 2nd February 2017 - Les Koses unavailable - message left to return call.

    - Monday 6th February 2017 - Called - no response, left a message to return call.

4 Regulatory Submissions

This section responds to DP&E's request for additional information and the submissions received from regulatory agencies. A response to each of the issues identified by the respective submissions is provided below.

4.1 NSW Department of Planning and Environment

4.1.1 Overnight Stays

Issue

The EIS states that "There will be no overnight berthing of cruise ships except in the event of unforeseen circumstances including mechanical failure, adverse weather and so forth".

Further clarification of 'unforeseen circumstances' should be provided, together with details of a formal communication protocol with affected residents in the event of cruise ships needing to remain a berth for all or part of a night.

Response

In unforeseen and rare circumstances, a cruise ship may need to berth overnight or part of a night period at the Breakwater Wharf. Although this is considered an unlikely and rare event, such factors as cruise ship mechanics and adverse weather may modify the planned cruise ship arrival and departure schedules. It is worth noting that extreme weather events and cruise ship mechanical breakdowns are not a frequent occurrence experienced in the Australian cruise ship industry.

Potential amenity impacts to surrounding residences may occur during the event of overnight berthing. Prior to operation, a formal communication protocol will be prepared to notify nearby residences in the rare occurrence of an overnight berth.

A potential method of communication is to utilise the internet. For example, appropriate websites that could display such information include the Port Authority of NSW (PANSW) specifically the Port of Eden website. An appropriate section would be the 'Marine Notices' page at http://edenport.com.au/marine_notices. An alternative website that would be adequate in community communication efforts includes the Bega Valley Shire Council's website at https://www.begavalley.nsw.gov.au/cp_themes/default/home.asp. Alternatively, community communication efforts can be made through the Council's and Eden Magnet's social media accounts, a communication app or local radio such as 2SEA (104.7 FM).

The proposed communication would provide a message containing information on the reason for the overnight or part night berth and the expected duration.

The communication protocol will be included within the project's Operational Environmental Management Plan (OEMP) (refer to section 10.4.2 of the EIS). The OEMP would also detail the mitigation measures to minimise any noise and air emissions impacts and manage security and pedestrian movements, during the extent of an overnight or part night berth. A community complaints and enquiries procedure would also be detailed.

4.1.2 Vessel Movements

Issue

The following should be provided:

- *Dredging Option 1: Backhoe Dredge (BHD) – The daily and total number of barge and/or tug movements associated with the removal of dredge material from the site.*
- *Dredging Option 2: BHD + TSHD (Trailing Suction Hose Dredge) (Single Handle Method) – The daily and total number of TSHD, barge and/or tug movements associated with the removal of dredge material from the site.*
- *Dredging Option 3: BHD + TSHD (Partial Double Handle Method) – The daily and total number of TSHD and large rock barge and/or tug movements associated with the removal of dredge material from the site.*

Response

Option 1 would involve the use of a Backhoe Dredge (BHD) for dredging of the entire dredge pocket. The BHD comprises a purpose built dredge consisting of a long-reach excavator integrally mounted on a spudded barge.

The dredger excavates the seabed and fills sequentially two to three self-propelled or towed by tugs split-hopper barges with a hopper capacity of 900m^3 to 1,200m^3. A towed barge would achieve up to six knots in open waters, resulting in a return transit time of two to three hours for each barge movement. Based on the dredging phase expected to run 24 hours, 7 days a week, up to eight return trips can be completed in a 24 hour period. This figure does not take into account various external factors such as adverse weather conditions which may affect travel speeds. Overall, it is estimated that up to 500 trips in total would be required depending on the barge size capacity (Australasian Marine Associates, 2016). This represents a conservative estimate as the number of trips will depend on factors such as barges may not be necessarily filled to their rated capacity due to bulking, the time taken to fill during detailed dredging and other factors.

Option 2 would involve the use of a Trailer Suction Hopper Dredge (TSHD) and the BHD throughout the dredging phase of the project. In this option, both dredges would transport dredged materials directly to the offshore disposal site. The BHD would require two barges in the order of 900m^3 to 1,200m^3 for efficient operation and one tow vessel. A towed barge would achieve up to six knots in open waters. Accordingly, return transit times of two to three hours would be expected for each barge movement.

Option 3 also involves the use of the TSHD throughout the dredging phase of the project. Like Option 2, the TSHD would complete a large majority of the dredging, with the BHD reaching areas deemed inaccessible to the TSHD. The hopper barge(s) would bottom dump the material in deep water within the dredging footprint in an area accessible by the TSHD. Large rock unable to be handled by the TSHD would be disposed of at the offshore disposal site via hopper barges.

Daily and total vessel movements are expected to be similar for Options 2 and 3. It is noted that EIS Mitigation Measure 3.17 (consistent with EPBC 2015/3782) requires that "*All vessels associated with dredging and construction will travel at speeds no higher than 10 knots within the port limits, en-route to, or at the disposal ground*." As described in Section 5.1.2 of the EIS, a typical TSHD has an approximate hopper capacity of 2,900m^3. Jacobs (2017a) have assumed for the dredge cycle of the TSHD that it takes 2 hours to fill the hopper, 40 minutes to travel to the offshore disposal site, 20

minutes to empty the hopper, and 40 minutes to return to the dredge basin. Based on this cycle, the TSHD vessel would need up to 80 trips in total (or six trips per day) during the dredging phase of the project to dispose of the other than rock (OTR) material. For the hopper barge movements, up to eight trips per day would be possible based on return transit times of two to three hours with total movements up to 30 to dispose of rock and rock-like materials and sediments near existing structures. Hence, the use of a TSHD for the majority of dredging would lower daily and total vessel movements.

In summary of the daily and total movements for each option using barges and/or tugs for return trips to the offshore disposal site is shown in Table 4-1.

Table 4-1 Summary of maximum estimated daily and total dredge vessel movements

Option	Daily	Total
Option 1: BHD	8	500
Option 2: BHD + TSHD (Single Handle Method)	14	110
Option 3: BHD + TSHD (Partial Double Handle Method)	14	110

The final number of daily and total vessel movements would depend on the methodologies chosen by the appointed Contractor, plant and equipment availability along with other external factors including weather conditions.

4.1.3 Dredging Option 3 – Large Rock Disposal

Issue

The EIS states at p76 that "Any large rock that cannot be handled by the TSHD would either be disposed of elsewhere within the site (e.g. along the lee side of the breakwater) or at the offshore disposal site via hopper barges".

Further detailed information and plans regarding any proposed rock dumping on site should be provided, together with updates to all relevant sections of the EIS.

Response

Naturally occurring (virgin) rock, including large boulders, would be dredged using a BHD, loaded into hopper barges and transported to the offshore disposal site.

To enable the installation of piles and scour protection, it is an anticipated that breakwater armour rock may require relocation. Engineering assessments have confirmed that any relocation of the armour rock will not destabilise the breakwall. Any relocated armour rock would be used to repair sections of the leeside of the breakwall (located inside the site) that has experienced damage over the years. The quantity of armour rock that would require relocation is not significant.

4.1.4 Maintenance Dredging

Issue

Indicative timeframes for maintenance dredging should be provided along with estimated maintenance dredging volumes.

Response

Advisian contacted the PANSW Survey Manager to understand the hydrographic survey requirements for Snug Cove in the Port of Eden. The below response has been formulated based on the information received from PANSW.

PANSW currently conducts surveys of the Eden Snug Cove Breakwater Wharf and the approach on a two-yearly interval. This survey does not include the greater Snug Cove bay. The survey frequency is based on a risk assessment with the main considerations being the depth of the berth, draft of the ships entering, siltation and frequency of vessels. PANSW surveys are conducted as part of the NSW Port Safety Operating License.

The frequency of maintenance dredging will depend on the natural weather and current influences and the sediment load entering Twofold Bay. For example, in parts of Sydney Harbour where sediment loads are low, maintenance dredging has not been required for over 10 years, but Newcastle Port requires constant dredging due to the high sediment loads from the Hunter River.

Sediment loads into Snug Cove are expected to be low, due to the lack of any large rivers discharging into Twofold Bay. For this reason, maintenance dredging requirements due to siltation are expected to be low. However, it is expected that the berth area would need to be swept periodically to maintain the declared depth in the approach channel and berth, due to periodic sediment scour and deposition caused by the arrival and departure of cruise vessels. The isopach diagram shown in Figure 4-1 below indicates a uniform distributed average accretion of approximately 0.2m (light orange colour) over the four year period between 2011 and 2015. The sedimentation allowance of 0.3m in addition to that provided by overdredging (averaging 0.5m) would mean maintenance dredging should not be required for some 4 to 10 years. Local sedimentation caused by redistribution in the short term could potentially be managed by bed levelling or sweeping. Regular surveys would be required to monitor changes in bed levels during operation.

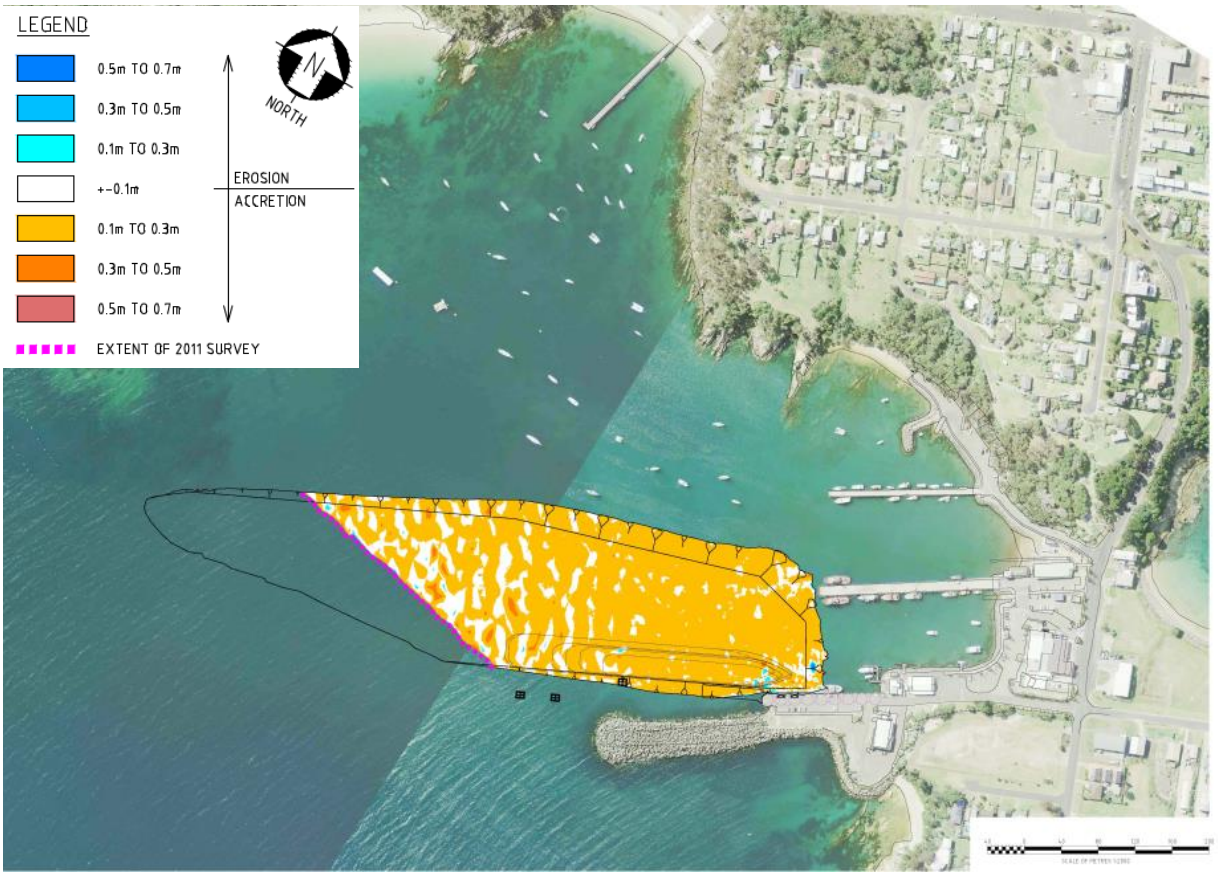

Figure 4-1 Isopach diagram for the 2011 and 2015 hydrographic surveys

Advice from PANSW has indicated that they "*will continue to conduct surveys on a risk assessment basis and this data can be used to monitor siltation*", which will assist in defining the quantity of maintenance dredging or sweeping that may be required in the future.

4.1.5 Geotechnical

Issue

The Geotechnical Investigation Interpretative Report states:

- *That the risk of dredging works undermining the existing Breakwater Wharf needs to be quantified and addressed as part of the detailed design (p13).*
- *Depending on the depth of the piles supporting the Multi - Purpose Jetty, and the proximity of the dredging, the dredge excavations may destabilise the Multi - Purpose Jetty.*

Mitigation of the potential for destabilisation of the Multi - Purpose Jetty by way of the provision of a sediment trap is addressed in the EIS (p365). However, mitigation is not proposed regarding the risk of dredging undermining the existing Breakwater Wharf. Further details of mitigation should be provided.

Response

The existing Breakwater Wharf consists of a row of nine circular steel sheet piled cells and intermittent half-cells which together act as a gravity retaining structure and support a concrete capping beam.

Each cell has a diameter of approximately 13.3m and is backfilled with a granular fill. According to the structural drawings, these cells were constructed on the rocky seabed varying in depth from RL-2.0m to RL-15.0m from the shore side to the seaward side. The flat steel sheet piles are typically founded into the underlying bedrock.

As deepening (dredging) of the berth pocket for the manoeuvring of ships was required, Advisian carried out an engineering analysis to determine the impact to adjacent structures. It was found that dredging directly in front of the existing wharf would have a significant impact on the stability of the structure. For this reason, the new berthing line was selected approximately 11m from the face of the existing wharf to achieve the required factor of safety and to minimise the impact of dredging. Further, maintaining a berth line parallel to the existing section of wharf was also found to be impractical for two reasons:

1. It was considered almost certain that this alignment would cause dolphin piles to refuse on rock or mass concrete armouring forming the lee side of the breakwater.
2. Dredging near the toe of the breakwater may result in toe failure and instability of the breakwater.

Considering these factors, the new berthing line was splayed approximately 4 degrees to the existing berthing line. The proposed new berth line orientation was reviewed further by PANSW and the Department.

It is concluded that the engineering analysis completed by Advisian has confirmed that the proposed berth pocket will not destabilise the existing Breakwater Wharf, the breakwall, Multi-Purpose Jetty or any other adjacent structures.

Issue

The Department notes that at Section 5.1.2 of the EIS (p77) states:

> *Scour protection will be required in one location (across Zones 1 and 2) as shown in Figure 5 - 1 of the berth pocket to protect existing and new structures from undermining or loss of structural integrity from scouring forces associated with ship propulsion systems, and tug operations.*

Further details and specifications of the proposed concrete block scour mattress and loopmatting should be provided and the Geotechnical Investigation Interpretative Report updated to address the protection the proposed scour protection would afford the Breakwater Wharf.

Response

Articulated concrete block mattresses (ACB) refer to a matrix of interconnected concrete block units for erosion protection. Units are connected by geometric interlock and/or cables, geotextiles, or geogrids, and typically include a geotextile underlayment for subsoil retention. The mattress is designed for a critical velocity of 4 m/s and is to have a minimum mass of 850 kg/m^2. The mattresses are formed from high strength, profiled concrete segments.

During the design process, an analysis was undertaken on the effects on the seabed from the anticipated bow thruster wash from the design vessels. Scour protection has been designed for vessels berthing on their starboard side at the wharf. Scour protection of the new piles and a section of existing wharf are to be provided by a 500mm thick articulated concrete mattress installed on the seabed. The scour mattress is to be placed after the dredging works are completed and before piling

of the new wharf. Approximately 1m x 1m sections would then be taken out of the scour mattress by the marine contractor at the locations of the new piles to facilitate the pile driving. After installation of the pile, any voids greater than 150mm (between the pile and the mattress) would be filled with deep underwater cementitious grout contained within fabric formwork.

The scour protection has been designed in accordance with the PIANC (2015) report no. 180-2015 "Guidelines for Protecting Berthing Structures from scour caused by ships", and is designed to prevent undermining of the caisson wall at the breakwater wharf, wharf piles and breakwater toe. Design of the scour protection has considered the following factors:

- Engine power of vessels.
- Propeller diameter.
- Bow thruster size and power.
- Depth at berth.
- Azipod size and power.
- Rudder arrangement.

The mattress would be cast onto a geotextile which would act as a filter between the concrete blocks and underlying seabed, to prevent washout of the underlying sediments through the mattress. The geotextile is specifically designed to be used with the concrete mattress and is typically cast into the mattress elements – this provides additional friction between the mattress and underlying seabed.

The proposed scour mattress would cover an area of 4,020m^2 and would extend along the toe of the caisson wall, over most of the berth width and westward along the toe of the existing breakwater as illustrated in Figure 5-1 of the EIS.

Having regard to the engineering design process, it is not considered necessary to update the existing Geotechnical Investigation Interpretative Report.

4.1.6 Water Quality

Issue

Construction

The following should be provided:

- *Water Quality Assessment for Dredging Option 2. The submitted Water Quality Assessment only addresses Option 1 and Option 3 (as worst case scenario).*
- *Confirmation that the sub-heading on p76 "Option 3 BHD + TSHD (Single Handle Method)" should read "Option 3 BHD + TSD (Partial Double Handle Method)".*
- *Confirmation that the Dredge Plume Modelling includes the potential use of a 'Drumcutter' for rock extraction.*
- *In regard to trigger value response levels:*

  a) An adjustment of the trigger response levels to reflect the expected performance of the dredging operation within a finalised baseline water quality monitoring program (having regard for the results of current field data collection program and detailed dredge plume assessment);

b) Detail as to how the correlation between turbidity and total suspended solids was derived using data representative of conditions in the vicinity of the proposed development; and

c) Clarification as to how ambient total suspended solid concentrations will be determined (such as by real-time monitoring at a reference site that is unlikely to be affected by dredging.

- *In regard to monitoring frequency and sensor maintenance:*

  a) Proposed trigger response levels based on short term consecutive readings; and

  b) Details of a sensor maintenance program to be implemented in the finalised water quality monitoring program to ensure turbidity data is representative.

Response

Water Quality Assessment

The three options considered in the EIS were:

- Option 1: BHD.
- Option 2: BHD + TSHD (single handling method).
- Option 3: BHD + TSHD (partial double-handling method).

Since submission of the EIS, an updated water quality assessment has been carried out by Jacobs (2017a), which includes an assessment of Dredging Option 2 (refer Appendix B). The updated assessment has been calibrated and validated against measured ADCP current data collected by Advisian at a number of locations in Twofold Bay during a 3 month period in late 2016.

In summary, Dredge Option 2 is predicted to produce similar total suspended solids (TSS) increases at the proposed seagrass and mussel farm monitoring locations as Dredge Option 3.

Modelling results for the hindcast wind scenario predicted that maximum daily mean TSS increases are 1-2mg/L above ambient at the proposed CB1 monitoring site in Cattle Bay, 10-15mg/L above ambient at the MU1 monitoring location, and 5-10mg/L above ambient at the LP1 monitoring location shown in Figure 4-2 below.

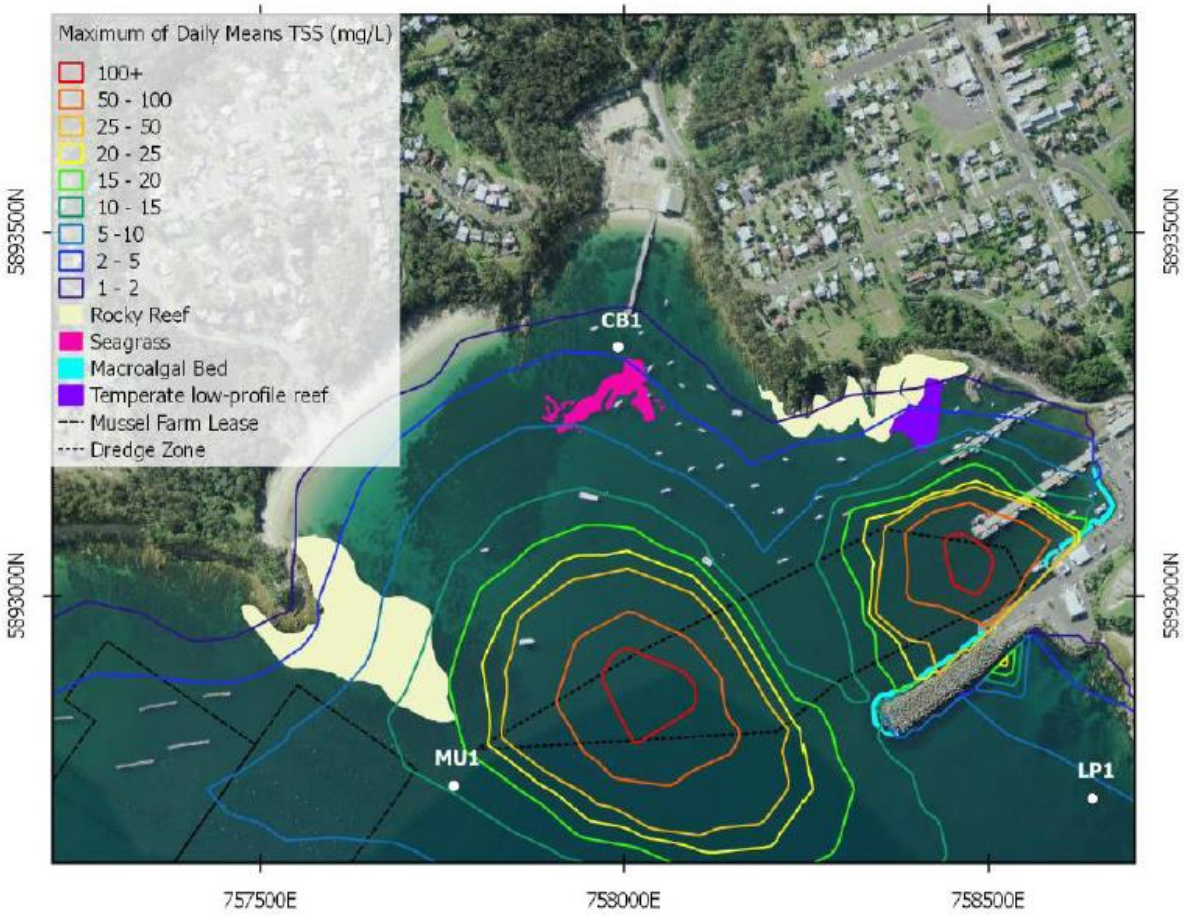

Figure 4-2 Option 2, hindcast wind scenario: proximity of benthic habitats and proposed monitoring locations to the dredge plume modelling TSS dispersal in Snug Cove

Seagrass in Cattle Bay would be expected to be exposed to low levels of TSS from the dredging operation under Option 2 and moderate levels of TSS under Option 3, as predicted from the dredge plume models. The sediment plume is not expected to extend into Cattle Bay under the Option 1 dredge scenario. Regardless of the dredge option selected, the dredge plume associated with the dredging program is not expected to result in permanent damage to the seagrass in Cattle Bay, as rhizomic seagrass are capable of drawing upon energy reserves in their root mass in order to offset periods of low light or enable growth from burial.

Model results of the disposal operations associated with Dredge Option 2 indicate that the highest TSS increases at the offshore disposal ground will occur near the water surface (top 10m) due to dumping of the sediment material at this location. Typically, TSS increases of greater than 10mg/L above ambient are confined to a radius of approximately 300m around the dumping location, as illustrated by the maximum of daily means maps for the "hindcast" scenario (Jacobs 2017a).

Confirmation of Sub-heading

It is confirmed that the sub-heading on page 76 of the EIS is to read as follows "Option 3 BHD + TSD (Partial Double Handle Method)".

Potential Use of 'Drumcutter'

A Drumcutter's purpose is not for dredging. A Drumcutter or similiar pre-treatment attachment may be used where mechanical pre-treatment of difficult rock extraction for the three dredging options is required. Due to the significant number and range of scenarios that could potentially be modelled, the Sediment Plume Impact Study (Jacobs 2017a) did not include modelling of the potential use of a "drumcutter".

In relation to the potential impacts, if any, of its use at the site, it is considered that:

1. Any turbidity impacts from the potential use of a Drumcutter or similar attachment would be likely contained to a limited area of the dredge footprint.

2. The Drumcutter would be operating deep in the water column and the material will not be oxygenated so it is anticipated that most of the turbidity generated should remain in the bottom few metres of the water column.

3. Residual energy and tidal currents may lift some of the material to the surface allowing it to disperse. It is likely that at a measuring point 500 metres from the site little or no increase in levels will be observed compared to the BHD operations and or from the TSHD.

The use of the Drumcutter or similar attachment will be monitored in accordance with the Water Quality Monitoring Program, to be implemented during dredging.

Trigger Value Response Levels

a) An adjustment of the trigger response levels to reflect the expected performance of the dredging operation within a finalised baseline water quality monitoring program (having regard for the results of current field data collection program and detailed dredge plume assessment);

The Jacobs (2017a) modelling has confirmed that trigger response levels proposed in the EIS are fit for purpose and will be effective in protecting seagrass as they represent the habitat that is most sensitive to increased turbidity. The plume modelling has confirmed that seagrass in Cattle Bay will experience periods of increased turbidity but it will not be sufficient in duration or intensity to result in measurable impact. No adjustment of trigger response levels is therefore proposed.

b) Detail as to how the correlation between turbidity and total suspended solids was derived using data representative of conditions in the vicinity of the proposed development; and

No correlation was undertaken at the time of the EIS as no baseline water quality data was available from the site. As the existing baseline water quality data shows poor correlation between the NTU and TSS measurements, an additional study will be commissioned to derive the statistical correlation for the relationship between NTU and TSS for water quality from the proposed dredge area at Eden. The statistical correlation will be developed prior to the commencement of dredging. The correlation will be further refined whilst dredging is being undertaken to help improve the accuracy of the correlation.

c) *Clarification as to how ambient total suspended solid concentrations will be determined (such as by real-time monitoring at a reference site that is unlikely to be affected by dredging.*

Ambient turbidity in Twofold Bay will be determined using the BAY1 monitoring site shown in Figure 9-15 of the EIS. A review of the plume monitoring report by Jacobs (2017a) has confirmed it will be a suitable reference site as there is no interaction of modelled dredge plumes with this site.

Monitoring Frequency and Sensor Maintenance

a) *Proposed trigger response levels based on short term consecutive readings;*

The proposed trigger response levels have been provided in the EIS. Short term consecutive readings will be available from the monitoring sites in real time at 30 minute intervals. Where short term consecutive readings e.g. 4 x 30 minutes are above a Level 1 trigger, validation of the data will be required within 6 hours. This will entail a number of system checks to identify whether the issue is related to a fault with the sensor or a communication error with the telemetry.

b) Details of a sensor maintenance program to be implemented in the finalised water quality monitoring program to ensure turbidity data is representative.

A sensor maintenance program will be provided by the contractor as part of the water quality monitoring program prior to the commencement of dredging. The contractor will be selected on the basis of providing a suitable sensor calibration and maintenance program that can demonstrate that turbidity data collected will be reliable and representative.

From Advisian's previous experience, the turbidity monitoring sensors likely to be deployed will require regular cleaning and calibration checks at each maintenance trip on a nominal four week cycle (although this will vary depending on type of sensors). As all data will be telemetered, any issues with data quality will be readily identifiable and a response can then be coordinated.

Issue

Offshore Material Disposal

The Offshore Dredge Material Disposal - Plume modelling (p4) is based upon Dredging Option 1 and the use of 500m - 800m³ split hopper barges to dispose of the dredge material over a 12 to 16 week period.

The Department notes that the EIS proposes the use of 900 - 1,200m³ barges. Further, the modelling does not address the proposed disposal of the dredge material under Dredging Options 2 or 3.

Option 2 would involve the use of 900 - 1,200m³ barges and a TSHD with 2,900m³ hopper to dispose of the dredge material over a 10 week period. Option 3 would involve the almost sole use of a TSHD with 2,900m³ hopper to dispose of the dredge material over a 6 week period.

The Offshore Dredge Material Disposal – Plume Modelling should be updated to include the proposed disposal of the dredge material under Options 2 or 3.

Response

Post submission of the EIS for public exhibition, Jacobs (2017a) undertook dredge plume modelling for the Option 2 disposal operation at the offshore disposal site in the Sediment Plume Impact Study

(Appendix B). The Option 2 disposal operation is considered to present the greatest potential for the generation of sediment plumes at the offshore disposal site due to the combined dumping of both the BHD hopper barges and the TSHD. Hence this offshore disposal option was selected by Jacobs as the representative case for the purposes of modelling.

The model results for Option 2 indicate that the highest TSS increases at the offshore disposal ground will occur near the water surface (top 10m) due to dumping of the sediment material at this location. Typically, TSS increases of greater than 10mg/L above ambient are confined to a radius of approximately 300m around the dumping location, as illustrated by the maximum of daily means maps for the "hindcast" scenario (refer to Appendix I of the Sediment Plume Impact Study).

Issue

Operation

Section 9.1.4 of the EIS (p170) states:

> *Localised and short - term increases in turbidity in the immediate vicinity of the wharf and approach path, by cruise ships and tug vessels are expected to settle and disperse relatively quickly (within 1 - 2 days).*

Details of modelling, potential impacts, ongoing monitoring and proposed mitigation in relation to sediment plumes generated by vessel movement during operation should be provided, particularly against the anticipated cruise ship visitation forecasts for peak cruise season plus other vessels anticipated to visit during this period. It is noted that visitations may occur over a number of consecutive days with no ability to disperse during this times.

Response

The potential operational impact of increased turbidity resulting from increased cruise shipping movements was assessed in detail by Jacobs (2017a). Modelling shows that cruise vessel operations may generate a substantial suspended sediment plume along the vessel arrival and departure route. However, the spatial extent is limited and the TSS increases at the identified sensitive receptors, away from the arrival and departure routes, are generally short-lived (usually less than one hour). The modelling also confirms that most of the elevated TSS will occur along the seabed and through the water column with relatively minor TSS visible at the surface.

Further, the results of the operational modelling found that TSS increases will reduce to less than 1mg/L within a three hour period. TSS increases will occur during vessel arrival and departures, approximately 2 -3 times per week, however given the short duration of the TSS increases, there would not expected to be any cumulative impacts. Jacobs (2017a) also found that during cruise ship arrival, TSS concentrations at the proposed MU1 monitoring location are expected to reach levels of up to 15-20mg/L above ambient for only a short period of less than 1 hour.

Ongoing periodic monitoring of water quality and surface sediments will be undertaken during operation and will be outlined in the Project OEMP.

4.1.7 Air Quality

Issue

Construction

Emissions from the proposed BHD, TSHD tugs and/or barges are not included in the submitted Air Quality Assessment.

Response

Section 13.2 of PEL (2016a), Appendix K of the EIS identified the primary equipment to be used for construction activities which included BHD, tug boats and barges in its assessment of construction air quality impacts. PEL (2016a) concluded that "*preliminary assessment indicated that all the proposed risks (demolition, earthworks, construction and track-out) would be small, resulting in negligible worst-case site risks*."

Further, PEL (2016b) assessed that exhaust emissions from the dredge plant and activities for Dredging Options 2 and 3 and concluded that it "*would have a negligible impact on air quality compared to the operational phase assessed in PEL (2016)*".

Issue

Operation

A protocol for the management of air emissions in the event of cruise ships needing to remain at berth for all or part of a night should be provided.

Response

Various mitigation measures addressing the potential environmental impacts of an overnight or part night berth will be incorporated into the OEMP. For example, potential mitigation measures to preserve air quality will include the use of low sulphur fuel during transit and berthing periods and the powering down of cruise ship vessels once berthed on Breakwater Wharf. Refer to response in Section 4.1.1.

4.1.8 Community Health

Issue

Although modelling indicates that with the use of low sulfur fuel, cruise ship emissions would not exceed the criteria at the closest sensitive receivers, the Department is aware that residents adjacent to the White Bay cruise terminal report respiratory tract irritation and other symptoms during the cruise season despite the use of low sulfur fuel at berths. In view of this, reference should be made to Air Quality as a key potential environmental impact on community health (p311).

Response

DP&E's comments are noted by the Department. However, having regard to the higher frequency of use of White Bay Cruise Terminal as well as the highly urban nature of the White Bay receiving environment compared to that of the Port of Eden, it is unlikely that the surrounding residents of the Port of Eden will experience the same level of potential adverse community health impacts. In support

of this statement, the EIS comprehensively assessed the potential air quality impacts of the Project and found that operational air quality was not a key potential environmental impact of the Project.

Prior to fuel restrictions placed upon the White Bay Cruise terminal in October 2015, air quality monitoring stations situated in Balmain recorded sulfur dioxide (SO_2) concentrations at a 10 minute average to be 500µg/m^3 in September 2015 (Pacific Environment Limited (PEL) 2015). This equates to an average of 177ppm. As a result of recent heightened community concerns, PANSW conducted continuous air quality monitoring services for SO_2 and $PM_{2.5}$ around the White Bay Cruise Terminal. NSW Health (2016) indicates that air quality measurements taken at White Bay and Balmain meet national air quality standards; however some residents close to the terminal had reported experiencing health impacts from air emissions.

Table 9-26 on page 264 of the EIS outlines background air quality for Albion Park. Albion Park monitoring station is the closest air quality monitoring station to the Port of Eden. As noted in Section 9.7.1 of the EIS, factors affecting air quality are significantly different at Albion Park to those at Eden, in particular air quality at Albion Park is significantly impacted by industrial sources and Eden's air quality is considered to be relatively unaffected by human activity. As stated in the EIS, the use of Albion Park is a conservative approach. In 2015, SO_2 averages at Albion Park were 0.07ppm.

As stated in Section 4.2.1 of the EIS, between 40 and 60 ships will be expected to berth annually at the Breakwater Wharf once the project is complete. Approximately 103 ships are expected to berth at White Bay Cruise Terminal in 2017 and an approximate total of 204 ships are expected to berth at the Overseas Passenger Terminal nearby in Circular Quay (Port Authority of NSW, n.d). The surrounding vicinity of White Bay Cruise Terminal has experienced a much higher level of urban development compared to that of the Port of Eden and local air quality is influenced by higher volumes of land traffic and marine vessels emitting emissions in the vicinity.

The average amount of SO_2 emitted at White Bay Cruise Terminal for just one month is significantly larger than the average amount of SO_2 emitted annually at areas surrounding the Port of Eden. With the Port of Eden having a notably lower background level of SO_2 than White Bay Cruise Terminal, it is anticipated that the same community health concerns cannot be applied to the Project.

4.1.9 Noise

Issue

Construction

A more detailed analysis of impact associated with dredging, noting that dredging is proposed to occur 24 hours a day for between 6 (Dredging Option 3) to 15 weeks (Dredging Option 1).

Response

The Dredging Options Noise and Air Assessment Addendum Report, prepared by PEL (2016b) (Appendix K of the EIS) includes a detailed construction noise assessment of all dredging options.

PEL (2016b) concluded that:

> *"All of the scenarios are predicted to cause some exceedances of the noise criteria at the nearest residential receptors. Noise impacts were predicted to increase by 1 to 6 dB(A) at sensitive noise receptors with an average noise increase of 2.6 - 2.8 dB expected for the combined BHD and TSHD single and partial double handing scenarios."*

It is relevant to note that the exceedances are limited to the categories of 'noticeable' and 'clearly audible' and do not fall within any of the 'intrusive' or 'highly noise affected' categories.

In relation to potential sleep disturbance, PEL (2016b) found that:

> "*Where dredging is undertaken during the night time period short term peak noise events such as shaking an excavator bucket or metal on metal impacts can potentially result in a L_{AMax} sleep disturbance noise event. The predicated L_{Aeq} noise levels at the nearest receivers in both NCA 1 and NCA 2 were 10 to 20 d(A) above background for night time dredging. Short term peaks of 5 – 10 dB(A) above the predicted L_{Aeq} noise level could be expected from impact noise events. Similar sleep disturbance impact noise levels are anticipated for each of assessment scenarios, However, it is expected that more frequent peak events would occur with the combined dredging scenarios.*"

Noise management measures would be implemented in accordance with the CEMP.

Issue

Operation

A more detailed analysis of sleep disturbance associated with the arrival of cruise ships during the period between 6:30am and 7:00am should be provided.

A protocol for the management of noise in the event of cruise ships needing to remain at berth for all or part of a night should also be provided.

Response

As discussed in Section 5.2 of Appendix K of the EIS, cruise ship movement within the Port of Eden during the hours of 6:30am and 7:00am is expected to be infrequent, as according to 2016 – 2019 cruise ship schedules, only three cruise ships are expected to arrive during the 6:30am-7:00am time period. The majority of ships would arrive at 8am and depart by 6pm. The longer term shipping schedules are not known at this stage, however it is anticipated that they would follow a similar pattern in arrival, departure and duration of stay.

During cruise ship transit to and from port, noise exceedances of up to 10dB are expected, however these are anticipated to be short duration exceedances. Refer to Appendix K of the EIS for further information.

Various mitigation measures addressing the potential environmental impacts of an overnight or part night berth will be incorporated into the OEMP. For example, potential mitigation measures to preserve noise amenity may include identification of major noise sources and restrictions on use. Refer to response in Section 4.1.1.

4.1.10 Aquatic Ecology Assessment

Issue

The Aquatic Ecology Assessment does not address sediment plumes generated by vessel movement during operation. Details of potential impacts and proposed mitigation should be provided. In particular potential impacts should be considered having regard to increased numbers of larger ships and cruise ships, including during peak cruise season. This should include an assessment of impact in relation to

anticipated paths of travel of various ship types through Two Fold Bay into Snug Cove to access the wharf.

The EIS and Construction Environmental Management Plan (Appendix D) should also be updated:

- *To provide detail as to how underwater noise will be managed in relation to impacts on biologically important habitats and during critical behaviours of marine mammals; and*
- *To reference the Underwater Piling Noise Guidelines – Government of South Australia.*

Response

The potential impacts to the marine environment from vessel movements during operation have been addressed in the Jacobs (2017a) Sediment Plume Impact Study. Modelling shows that cruise vessel operations have the potential to generate a substantial suspended sediment plume along the vessel arrival and departure route. However, the spatial extent is limited and the TSS increases at the identified sensitive receptors, away from the arrival and departure routes, are generally short-lived (usually less than one hour).

Jacobs (2017a) found that sediment plume modelling based upon the Costa Diadema vessel generates lower concentrations of TSS at the wharf (150 – 200mg/L), with TSS declining steadily over the first 6 hours and back to ambient within 15 hours. TSS concentrations within the surface water around the wharf are predicted to remain at a very low concentration during entering and egressing of cruise vessels (approximately <20mg/L). Movement of a large vessel through the dredge basin will generated TSS concentrations of approx. maximum 300mg/L, and will rapidly decline within 3 hours. Figure 5-11 of Appendix B outlines the proposed generated TSS during cruise vessel entering and egressing paths.

Figure 6-6 and 6-7 of Appendix B highlight the reasonable distance between anticipated TSS within the water column and the various sensitive marine environments Snug Cove and Cattle Bay (Jacobs 2017a). Jacobs (2017) concluded that the accumulation of sediment over time resulting from sediment plume generation may result in minor alterations to localised water depths, light penetration and water temperature. Such factors may affect benthic habitats such as seagrasses and reefs. Jacobs (2017a) predicts that operational sediment plume generation will have no major impact upon to fisheries resources in the surrounding area. Marine fauna has the potential to be affected due to the impacts of sediment plume generation, with marina fauna in the immediate vicinity of the sediment plume being the most affected. However, such factors as minor loss of habitat or temporary displacement of food resources are not expected to have a significant impact upon the marina fauna of Twofold Bay (Jacobs 2017a).

Mitigation measures recommended for the operation of the Project will be contained in the OEMP prepared for the Project.

Potential impacts from underwater noise generated by construction activities such as dredging and piling will be carefully managed in accordance with the Project specific EPBC referral conditions, Sea Dumping Permit and the *Underwater Piling Noise Guidelines* (DPTI 2012). This includes adopting safety zones for the duration of the piling activities and adopting increased safety zones where piling is undertaken during the southward migration period between September and November (inclusively). The management measures will be confirmed once the EPBC referral conditions are finalised by DoEE and will be incorporated into the Construction Environmental Management Plan (CEMP).

4.1.11 Coastal Processes

Issue

The GHD wave transformation modelling referred to in the EIS (p 336) should be included as an Appendix to the EIS.

Response

A copy of the GHD Wave Modelling report can be found in Appendix D.

4.1.12 Lighting

Issue

Section 9.9 'Visual Amenity' of the EIS partially addresses the impact of proposed lighting. However, dredging is proposed to occur 24 hours a day for between 6 (Dredging Option 3) to 15 weeks (Dredging Option 1). Further information regarding proposed lighting and lighting impacts during the dredging and construction period should be provided.

Response

As outlined in Section 9.9.2 of the EIS, lighting from the operation of dredging vessels, plant and equipment will be visible during night-time dredging periods. Viewpoint 9 and Viewpoint 10 are considered the closest residential properties to the Project site (refer to Figure 9-38, page 284 of the EIS) with distances of approximately of 150m and 300m respectively. Based on these distances of the dredge boundary, the potential for light spill impacts from water-based dredging vessels and the land based construction works area is considered to be low. In this regard, it is considered that the closest residential properties will not be adversely impacted by lighting during the dredging phase of the project.

In addition to the above, the Port of Eden is an active working port with a range of vessels entering and egressing from the port daily, during daytime and night-time periods. The Breakwater Wharf and nearby Multipurpose Jetty and Mooring Jetty contain existing light poles and edge lights as well as street lighting in the vicinity provided for night-time lighting. These are all currently visible from residential properties adjoining the Port. In this context, the contribution of the additional lighting impacts from dredging works to the existing environment will be minimal.

It is noted that by continuing dredging 24 hours a day, 7 days a week, the construction phase of the project is not only significantly shortened but the potential environmental impacts are also significantly reduced.

4.1.13 Cruise Ship and Other Vessel Simulations

Issue

Plans showing the swept path of cruise ships and other large ships entering/ exiting Snug Cove are requested to illustrate the area potentially affected by propeller action from the range of anticipated ships/vessels.

Response

As indicated in Section 5.2.1 of the EIS, approval for the use of the Breakwater Wharf extension is being sought for use by cruise ship vessels only. Other potential future users of the wharf extension would be the subject of a separate approval, if required.

The potential effects of propeller action by cruise ships upon the marine environment of Twofold Bay and Snug Cove has been modelled by Jacobs in the Sediment Plume Impact Study (refer to Appendix B). Section 5.3 of Appendix B outlines the potential for sediment to be mobilised from the seabed and suspended into the water column as a passive plume as a result of vessel movement, particularly propeller action.

For the purposes of the operational plume assessment, Jacobs adopted the two cruise ship models considered by Smartship Australia: Regal Princess and Costa Diadema including their berthing and departure routes. Four operational scenarios were simulated within the model to provide an assessment of the potential sediment plume resulting from typical cruise vessel approach and departure operations at Eden.

Spatial and temporal comparisons from the operational plume modelling were presented by Jacobs. Figure 5-11 of Appendix B maps out the maximum total suspended solids (TSS) impacted and mobilised into the water column during the arrival of the larger modelled cruise ship Costa Diadema at Breakwater Wharf through Snug Cove and Twofold Bay. The spatial maps were modelled from extreme propeller power with a hind cast wind. Figure 5-11 of Appendix B gives an adequate overview of how sediment would react to propeller action in potentially affected areas.

It was concluded that increases in turbidity and TSS will occur in close proximity to areas frequently affected by sediment plumes generated by operational activities of the project (Jacobs 2017a). However, direct impact to water quality and marine fauna and flora is anticipated to be low (Jacobs 2017a) (refer to Appendix B for further conclusions on the effects of propeller action on Twofold Bay and Snug Cove).

4.1.14 Monitoring

Issue

It is noted that existing air quality is based on data from Albion Park and in the case of $PM_{2.5}$, Wollongong (EIS p 264) which the EIS acknowledges would not be representative of Eden. It is also noted that background water quality monitoring has commenced (EIS p150). It is also understood that local metocean data is being collected. The EIS should provide an outline of the pre - construction, construction and operational monitoring proposed in relation to noise, water quality and air quality.

Response

Table 4-2 provides a summary of the proposed pre-construction, construction and operational monitoring proposed in relation to noise, water quality and air quality. Reference is made to the CEMP which contains construction monitoring requirements.

Table 4-2 Summary of Air, Water and Noise Monitoring

Phase of Project	Air Quality	Water Quality	Noise
Pre-construction Phase	• Nil	• Baseline water quality monitoring (completed). • Vessel Risk Assessment for each vessel prior to mobilisation by the vessel owner /operator to determine if an Invasive Marine Species (IMS) inspection required by the Contractor(s),	• Nil
Construction Phase	• Contractor(s) to visually monitor emissions and repair or replace equipment parts as required.	• Real time turbidity monitoring during the dredging phase to monitor turbidity at key receptor sites and to validate previous plume modelling. • Contractors to monitor construction works and report any incidents that may affect water quality. • Monitoring of the dredge vessels and barges in accordance with the *Biosecurity Act 2015*.	• Monitoring of marine mammals during piling operation procedures to ensure minimal noise impacts. • Contractors to monitor noise and vibration during the construction phase in accordance with the Construction Noise and Vibration Management Plan (CNVMP).
Operational Phase	• Nil	• Surveying of marine vegetation to determine the degree of damage and recovery of benthic habitats after the construction phase of project. • Ongoing periodic monitoring of water and sediment quality.	• Nil

4.1.15 Social Economic Impact

Issue

The potential impact on tourism and existing tourism businesses if, for example, operational impacts on marine mammal behaviour due to larger ships and increased numbers of cruise vessels traversing Twofold Bay and the adjacent coast, together with deterred whales and dolphins entering Twofold Bay.

Response

The enabling of the berthing of cruise ships directly onto Breakwater Wharf is expected to increase tourism and economic activity within Eden and the Sapphire Coast region. As outlined in Section 9.11.3 of the EIS, major positive socio-economic impacts would result from the project. This involves mainly job creation and a significant boost the local economy by increased tourist visitation. Based on previous and ongoing stakeholder and community consultation efforts (refer to Section 7.3 of the EIS), it is evident that the project is strongly supported by the community and commercial operators.

Section 6.2 of the Aquatic Ecology Assessment (Appendix M of the EIS) discusses the potential operational impacts of acoustic interference to marine mammals within the project vicinity. During the main cruise ship season, it is unlikely that whales will be in the area, however, resident dolphins and seals may still be present.

Ship noise is typically low frequency and is expected to have minimal adverse impacts upon marine mammals migrating past or feeding within Twofold Bay. This low level of frequency is often lost amongst natural underwater noises such as wind and waves hitting the beachfront and rocky shorelines.

Considering the anticipated number of vessels expected to enter the Port, the current use of the Port including a high level of vessel noise from both recreational and commercial vessels, the operational impacts of vessel noise to marine mammal behaviour are not expected to be significant. The most likely impact of any ongoing operational noise source will be short term avoidance of the immediate berthing area by marine fauna. In this regard, there is not expected to be any negative impacts to existing and future tourism activities at Twofold Bay.

4.2 NSW Office of Environment and Heritage

4.2.1 Dredging Plan

Issue

The report titled 'Beach sand nourishment scoping study' prepared by Aecom in 2010 on behalf of the Sydney Coastal Councils Group http://www.sydneycoastalcouncils.com.au/sites/default/files/beachsandnourishmentscopingstudy.pdf provides a good example of understanding the potential impacts of offshore dredging on adjacent beaches, and what information is required to make this sort of assessment (specifically Section 5.4 - pages 35-37) and should be used as a guide for this EIS on what to cover. It covers the impacts that may result from a change in wave climate from the deepening, which has now been partly assessed in the Eden Breakwater EIS (but with limitations - see below). It also covers the possible impacts that may occur through slow sediment transport rates infilling the dredged area through a flattening of the batter slope in a shoreward direction, and whether this could have any long term impacts on starving available sand from the adjacent beaches, which has not been considered in this EIS. This is a possible long term impact

that should be quantified in the EIS by calculating sediment transport rates in this part of Twofold Bay, pre and post dredging. For example, a shoreward flattening of the batter slope of the dredged area may overtime intersect with the limit of offshore sediment transport from extreme storm events and potentially starve the beach from sand that would have otherwise moved back onshore.

In addition, while a closure depth of around 6m below AHD has been calculated for an extreme event based on SBEACH modelling (100 year ARI) in the EIS, there is good research that outlines that over longer time periods much greater closure depths become relevant for sediment transport processes for the NSW coast. This should be discussed in terms of possible longer term impacts on Cocora Beach. Also, SBEACH modelling completed in the EIS cannot account for factors such as rip activity that can significantly enhance beach erosion and transport sand well beyond what the modelling predicts for a particular event eg see papers by Angus Gordon - http://www.coastalconference.com/2015/papers2015/Angus%20Gordon%20Full%20paper.pdf

and Kinsela and Hanslow http://www.coastalconference.com/2013/papers2013/NSWCC Kinsela Hanslow 2013.pdf which outline the above points.

If these potential impacts cannot be fully quantified and definitively shown to not have any impacts on the adjacent beaches over longer timeframes of 50-100+ years, then mitigation measures such as enhancing the beach through some nourishment from the dredging should be included as a precautionary measure.

Response

In response to this issue concerning the impacts of dredging on the immediate coastal environment, additional assessment information is provided below.

Cocora Beach Storm Erosion and Onshore-Offshore Transport

The limits of beach processes have been reported in conference publications (e.g., Gordon, 1987; Kinsela & Hanslow, 2013) with the most comprehensive treatments including the subaqueous limits of littoral drift transport presented in the journal papers Nielsen et al., 1992 and Nielsen, 1994. The most comprehensive treatment of the impacts of offshore dredging on beach processes is found in the work undertaken by Geomarine Pty Ltd as reported in the EIS for the Metromix Marine Aggregate Proposal, as summarised in Nielsen et al., 1991.

The papers and studies referenced above deal with open coast beaches for which the mean *significant* wave height is around 1.5m (GHD 2016). However, within Twofold Bay and in respect of Cocora Beach, the average unrefracted offshore *significant* wave height is 0.36m (GHD 2016). Therefore, the "rules of thumb" gleaned from the above references are not applicable to Cocora Beach. Accordingly, the limits of littoral processes for Cocora Beach have been determined by the application of various internationally-acknowledged coastal models as discussed further below.

Hallermeier Modelling

Hallermeier (1981, 1983) defined a *shoal zone* by two water depths; d_s being the limit of intense onshore-offshore transport during storms and d_o being the limit of significant on/offshore transport. Those depths were given as follows (Hallermeier 1983):

$$d_s = 2.9\,H\,/\,(s\text{-}1)^{0.5} - 110\,H^2/[(s\text{-}1)gT^2]$$

$$d_o = 0.018\,H\,T\,[g/(s\text{-}1)D_{50}]^{0.5}$$

where H is the *significant* wave height exceeded 12 hours per year, T is the associated wave period, s is the specific gravity of the sediment, g is the acceleration due to gravity, and D_{50} is the median sediment grain size.

Adopting the extreme 100 year significant wave height of 3.11m with wave period 10.4s, d_s has a value of 6.4m, which agrees closely with the result of SBEAQCH modelling.

Adopting from GHD (2016) an average value of 0.36m for the effective unrefracted offshore significant wave height at Cocora Beach for the dredged condition and an average value for the median grain size in the vicinity of the shoal zone of 247 microns, the limit of significant on/offshore sand transport was calculated to be d_o = 8.0m.

Swart

Swart (1974) developed a schematic model of on/offshore beach profile development and calibrated this against small-scale and full-scale model tests under regular wave conditions. The lower limit of offshore sand transport was determined as:

$$h_m/L_o = 0.0063\exp[4.347H_o^{0.473}/(T^{0.894}D_{50}^{0.093})$$

where h_m is the water depth at the limit of offshore sand transport, L_o if the deep water wave length, H_o is the deep water wave height, T is the wave period and D_{50} is the median grain size.

Adopting the 100 year ARI storm condition, h_m = 7.7m.

Dredged Batter Slope

The proposed dredged batter has a slope of 1V:10H; that is, a slope of 5.7°. There is no Australian Standard for the guidance on the stability of dredged batter slopes. In accordance with the British Standard BS6349-5 Dredging Reclamation, stable batter slopes for fine sand are 5° (1:10 approx.) in active water and 15° (1:4 approximately) in still water.

As shown above, the proposed dredged footprint offshore of Cocora Beach is beyond the shoal zone of Hallermeier (1981, 1983); that is, it lies beyond the zone that would be active in respect of any significant wave-induced littoral drift transport, and tidal currents are well below those required to transport fine sand. The surface sediments have been tested and found to have from 2% to 12% silt and clay content, attesting to quiescent hydrodynamic conditions. As the proposed batter slope has been adopted to be stable in active water, no significant flattening of the slope is expected.

It is therefore concluded that:

- The proposed dredged pocket lies beyond the zone of significant on/offshore littoral processes.
- The dredged batter slope offshore of Cocora Beach would be stable in the long term.

4.2.2 Noise Management

Issue

Neither the CEMP nor the EPBC Referral provide detail on how underwater noise will be managed in relation to the impacts on the biologically important habitats, and during critical behaviours of marine mammals. Specifically, Appendix D of the Construction Environmental Management Plan (CEMP), Section 7.2 Aquatic Ecology refers to the EPBC Referral (1 October 2015) as having specific details on the

management of underwater noise associated with construction. However the EPBC Referral doesn't have any specific information and refers to the CEMP as having specific details.

More importantly, both fail to reference the document titled Underwater Piling Noise Guidelines - Government of South Australia. OEH has previously recommended in our SEARs that these guidelines including their specific mitigation measures be adopted.

The CEMP should be updated to reflect the above, otherwise both documents create a circular reference where there are no specific management and mitigation measures included.

In addition, the Relevant References/Standards section of the CEMP should also be updated to reference the Underwater Piling Noise Guidelines - Government of South Australia. Section 10.3 of the EIS should also be updated to reference the Underwater Piling Noise Guidelines - Government of South Australia, specifically Ref 3.19, rather than referencing the EPBC referral.

Response

Potential impacts from underwater noise generated by construction activities such as dredging and piling will be carefully managed in accordance with the project specific EPBC referral conditions and the *Underwater Piling Noise Guidelines* (DPTI 2012). This includes, but is not limited to adopting safety zones for the duration of the piling activities and adopting increased safety zones where piling is undertaken during the southward migration period between September and November (inclusively). The management measures will be confirmed once the EPBC referral conditions are finalised by DoEE and will be incorporated into the CEMP.

4.2.3 Operational Environmental Management Plan

Issue

In relation to the operation phase of the wharf, OEH notes that an Operational Management Plan will be prepared and submitted for approval by the Secretary of DP&E prior to the commencement of operation of the Project (berthing of cruise ships).

OEH requests that we are consulted in the development of this plan, particularly in relation to the operational aspects of the project on terrestrial ecology (birds) and marine mammals. OEH would be looking for reassurance that the mitigation measures set out in Section 10.3 Summary of the Proposed Mitigation Measures of the EIS will be included in the OEMP.

Response

The submission is noted. The Department agrees to consult with OEH during the preparation of the OEMP.

4.3 NSW Environment Protection Authority

4.3.1 Construction Noise and Vibration Management Plan

Issue

The EPA notes in the EIS, the commitment to manage construction noise via a detailed Construction Noise and Vibration Management Plan (CNVMP) for the project, and that it will be prepared by the successful contractor prior to commencement of works on site.

The EPA recommends that the Department of Planning and Environment include as a condition in any approval, a requirement to develop and implement a CNVMP consistent with the NSW "Interim Construction Noise Guideline" (ICNG) and the "Transport for NSW Construction Noise Strategy" (or equivalent). The CNVMP may include (but not be limited to):

- *applying all feasible and reasonable work practices and mitigation measures to minimise noise impacts;*
- *detail a targeted range of management and monitoring options including provision of respite periods during construction, and a detailed communication and complaint management strategy for impacted residents up to, and including, provision of alternate accommodation.*

Response

A CNVMP will be developed generally in accordance with the NSW "Interim Construction Noise Guideline" (ICNG) and the "Transport for NSW Construction Noise Strategy and will include the application of feasible and reasonable work practices and mitigation measures, including the consideration of respite periods, to minimise noise impacts on impacted residents.

4.3.2 Highly Affected Noise Levels

Issue

The EPA notes that the main sources of noise and vibration emissions are likely to include:

- *piling and installation of rock anchors*
- *dredging*
- *barge movements*
- *demolition works*
- *truck and vehicle movements*
- *movement and positioning of materials onsite*
- *operation of work boats for a range of related purposes*

All works, with the exception of dredging, are proposed to be undertaken within standard construction hours. The EPA notes that predicted noise levels during impact piling exceed the "Highly Affected" level at some residences.

The EPA recommends that, should approval be granted, the proponent ensure a demonstrated commitment within their CNVMP to the provision of respite periods where noise exceeds the Highly Noise Affected level of 75dBLAeq, 15 minute.

Response

It is noted that noise modelling undertaken by PEL (2016b) did not predict exceedances of >75dB(A) for any of the three dredging options. On that basis, no respite periods for dredging are required.

Noise modelling undertaken by PEL (2016a) predicted exceedances of the "Highly Affected" level for scenario 3 (piling) only, with the highest modelled exceedance being 79dB(A) at SR38. As part of the proposed mitigation measures to manage potential noise and vibrational impacts, guidelines addressing the duration and frequency of respite periods during the marine piling construction phase of the project will be outlined in the CNVMP.

4.3.3 Dredging Outside Standard Construction Hours

Issue

Dredging activities are proposed to be undertaken 24 hours a day, seven days a week for a period of 6 to 15 weeks, depending on the final dredging option chosen. The EPA notes that predicted noise levels at the nearest residences at night would be 10 to 20dB above Rating Background Levels. As per ICNG, the EPA and the Department of Planning and Environment usually limit noise from infrastructure works outside of standard construction hours to be no more than 5dB about background. The EPA advises that works undertaken outside of standard construction hours may include public infrastructure works that shorten the length of the project and are supported by the affected community or where there is a clear demonstration or justification for need for this to occur.

Response

During the construction phase of the project, it is proposed that continuous dredging activity is undertaken 24 hours a day, 7 days a week. This is expected to last for a period of six to 15 weeks depending on the selected dredging option. Continuous dredging over a 24 hour period is an important operational factor during the construction phase. It will decrease the time needed to complete the dredging component of the project, whilst also limiting cumulative potential impacts upon the surrounding environment. Further, it is noted that the delivery of the Project is considered a high priority for the NSW Government and is strongly supported by the affected community which is proposed to bring long term socio-economic benefits for the local and regional communities.

4.3.4 Noise Mitigation

Issue

The EPA notes that noise levels as a ship transits to berth, and while at berth, are predicted to exceed the Industrial Noise Policy criteria by 2 to 12dB at nearby residences, with the highest predicted noise levels around 49 to 51dBA. The key noise sources while at berth include the exhaust stack and mechanical ventilation plant. The Environmental Assessment identifies that there are limited or no opportunities to reduce noise levels at the noise source, along the transmission path, or at potentially affected noise sensitive receiver locations. The EPA advises that potential noise mitigation measures that are implemented at other cruise ship wharves include:

- *eliminating or reducing the volume of all-deck announcements (apart from mandatory safety drills), or music from open decks;*
- *running on minimum necessary generator/engine power.*

Response

The above mitigation measures addressing noise control during the operational phase of the project will be incorporated into the OEMP for the project. In relation to the eliminating or reducing the volume of deck announcements, this would occur with the exception of when required for health/safety or emergency reasons.

4.3.5 Overnight Berthing

Issue

The EPA notes that the EA does not discuss in detail, circumstances when a ship may need to remain berthed for part or all of the night time period and the proposed strategy in communicating this to affected residences.

The EPA recommends that should approval be granted, the proponent consider the development of a formal communication protocol in the event of ships needing to remain at berth over part or all of a night.

Predicted noise levels exceed the sleep disturbance screening criteria for transit of ships to wharf during the night time half hour before 7am. Should this be a likely occurrence, the EPA recommends a more detailed analysis of sleep disturbance be undertaken as required by the NSW Industrial Noise Policy.

Response

A detailed analysis of sleep disturbances is not deemed necessary due to the infrequent arrival of cruise ship vessels prior to 7:00 am. Refer to Sections 4.1.1 and 4.1.8 above for further information on this issue and the proposed protocol during the event of an overnight berth and mitigation measures for potential noise impacts during the operational phase of the project.

4.3.6 Trigger Values Response Levels

Issue

Plume modelling indicates that dredging is unlikely to increase Total Suspended Solid (TSS) concentrations by more than 5mg/L at the proposed monitoring sites. The EPA notes that the proposed level 1, 2 and 3 trigger response levels are greater than the predicted 5mg/L (daily mean TSS concentration >10, 15, and 25mg/L respectively) and therefore do not reflect the expected performance of the dredging operation with regard to the dredge plume. Further to this, it is unclear how the ambient TSS concentration will be determined. The EPA notes that a field data collection program was commenced in September 2016 which will provide data for calibration and validation of a detailed dredge plume assessment.

The EPA understands that continuous turbidity monitoring will form the basis for tracking performance against the trigger levels. As the trigger response levels are defined as TSS concentrations, the EPA recommends the proponent derive a correlation between TSS and turbidity.

The EPA recommends that the proponent adjust the trigger response levels to reflect the expected performance of the dredging operation within a finalised baseline water quality monitoring program (having regard for the results of current field data collection program and detailed dredge plume assessment).

The EPA recommends that as part of a finalised baseline water quality monitoring program, the proponent detail how the correlation between turbidity and TSS was derived using data representative of conditions in the vicinity of the proposed development.

The EPA recommends that as part of a finalised baseline water quality monitoring program, the proponent clarify how ambient TSS concentrations will be determined (such as by real-time monitoring at a 'reference' site that is unlikely to be affected by the dredging).

Response

The baseline water quality monitoring program conducted by Elgin Associates (2017) has provided a baseline of ambient water quality within Twofold Bay for a range of parameters. Refer to Appendix C.

Turbidity was relatively low (<1.5 Nephelometric turbidity unit (NTU)) across all sites throughout the monitoring period with median site-specific turbidity ranging between 0.3 and 0.9 NTU. Outer Twofold Bay (BAY2) consistently had the lowest turbidity (median 0.3 NTU), with waters of Cattle Bay (CB1) and inner Twofold Bay (BAY1) characterised by highest turbidity (median 0.9 NTU). Furthermore, surface waters were less turbid than bottom waters across all sites.

Elevated levels of turbidity were observed across all sites during post-event sampling (25/10/16) and the subsequent sampling round (1/11/16) due to residual weather effects on Twofold Bay water quality. Values as high as 7.4 NTU (in Cattle Bay) were recorded during this post weather sampling period. TSS concentrations during this period were also in the order of 2-3mg/l, whereas most values were <1mg/l for the duration of the program. TSS values as high as 25mg/l were recorded in the September 2016 survey however the values were considered anomalous (Elgin Associates 2017).

Analysis of TSS versus turbidity using the Elgin Associates water quality data shows very poor correlation. The monitoring contractor will be responsible for deriving a NTU/TSS correlation using either on site calibration or lab based calibration using sediment collected from the proposed dredge area at Eden.

4.3.7 Monitoring Frequency and Sensor Maintenance

Issue

The EIS proposes that management responses would be triggered where daily average TSS concentrations exceed trigger response levels. The EPA advises that this approach may not allow for management responses to be implemented within an appropriate timeframe. The EIS states - "Triggers based on short term consecutive readings (e.g. 5 x 15 minutes) are not recommended when monitoring in real-time as the risk of a false exceedance is very high. A false exceedance is commonly caused by abnormal fouling on senor, drift algae covering sensor, fish or other biota obstructing sensor".

The EPA recommends that the proponent propose trigger response levels based on short term consecutive readings, and that the finalised baseline water quality monitoring program implement a sensor maintenance program to ensure turbidity data is representative.

Response

The proposed trigger response levels will be based on data telemetered from the monitoring sites in 30 minute intervals.

A sensor maintenance program will be provided by the water quality monitoring contractor prior to the commencement of the dredging program. It will be an expectation that a monitoring contractor is selected on the basis of providing a suitable sensor calibration and maintenance program that can demonstrate that turbidity data collected will be reliable and representative.

From Advisian's previous experience, the turbidity monitoring sensors likely to be deployed will require regular cleaning and calibration checks at each maintenance trip on a nominal four week cycle (although this will vary depending on type of sensors). As all data will be telemetered, any issues with data quality will be readily identifiable and a response can then be coordinated according to the issue encountered.

Where short term consecutive readings e.g. 4 x 30 minutes are above a Level 1 trigger, validation of the data will be required as quickly as possible. This will entail a number of system checks to identify whether the issue is related to a fault with the sensor or a communication error with the telemetry.

4.3.8 Air Quality

Issue

The EPA notes that the EIS assessment modelled potential exceedances of air quality impact assessment criteria where 2.7% sulfur and to a lesser extent 0.5% sulfur is used. The EPA advises that the Commonwealth is currently moving to legislate a limit on the sulfur content of fuel used by cruise ships berthed in Sydney Harbour to 0.1%, via the Navigation Act (2012). The EIS modelling predicted that if this fuel is used by ships at Eden, maximum ground level concentrations are less than impact assessment criteria. Reasonable and feasible mitigation measures are therefore available and the EPA supports the proponents proposed mitigation measures that cruise ships entering the port of Eden adopt low sulphur fuels to minimise potential air quality impacts.

The EPA notes that impacts associated with overnight visitation were not assessed.

While overnight visitation is not proposed, the EPA recommends, should approval be granted, the proponent develop a protocol for the management of air emissions in the event that a ship un-expectantly is required to berth for part or all of the night.

Response

During the operational phase of the Project, the overnight berthing of cruise ship vessels will be only in unforeseen circumstances as discussed in Section 4.1.1 above. Various mitigation measures will be incorporated into the OEMP to limit operational impacts, in the rare occurrence of an unexpected overnight berth. To decrease adverse impacts upon air quality, the recommended use of low sulphur fuel will be incorporated into the OEMP for the transit and berthing protocol of cruise ship vessels in Twofold Bay and Snug Cove. Refer to Section 4.1.1 for further details.

4.4 NSW Department of Primary Industries

4.4.1 Scour Protection

Issue

Scour protection in the form of articulated concrete block scour mattress is proposed in one location adjacent to and beyond the end of the existing wharf as indicated on page 77 and Figure 5.1 of the EIS. DPI does not support the use of articulated concrete block mattress as it will alienate the sea floor from aquatic life and provide poor habitat. DPI recommends scour protection in the form of a mattress of well sorted angular rock which will provide numerous voids and different shaped and oriented surfaces for colonisation by aquatic flora and fauna.

Response

Rock scour protection was considered during the design process in lieu of articulated concrete block scour mattresses. Articulated block mattresses were chosen as the preferred option for scour protection for the following reasons:

- If rock is used for scour protection and not tied together in the form of a mattress, very large rock would be required to withstand the expected thrust velocities from the vessel thrusters. The very large rock would require several filter layers of smaller rock to be installed to prevent washout of bed material through the rock. This would necessitate a large dredge volume to accommodate the expected thickness or the rock protection.
- If rock in the form of a mattress is used (e.g. plastic-encased gabions mattresses), there is a risk that the mattress could unravel if the structural integrity of the mattress basket is compromised – there is a risk of this occurring if the mattress is damaged by anchors or abrasion due to the movement of rock from within the mattress. Such mattresses would not provide the same in-situ density as a concrete mattress of the same thickness and a thicker mattress would be required, increasing the required volume of dredging.
- The concrete mattress does not result in the removal of rocky seabed habitat for marine organisms as it replaces an area which is currently sandy seabed. Note also that the mattress is to be located within an existing berth pocket in an existing port, so there would be no loss of habitat when compared with the existing situation. Alternative rocky seabed habitat is available nearby at the adjacent breakwater and at the rocky seabed immediately to the east of the proposed articulated concrete block mattress.

4.4.2 Water Quality Monitoring

Issue

Monitoring locations

The EIS notes (section 9.1.5 and Appendix D of The Construction Environmental Management Plan) that a real time turbidity monitoring program will be undertaken during dredging with samples collected from 3 sites – CB1, MU1 and Bay 1. The Department has previously requested an additional site to the east of the dredge area, south from Lookout Point to detect any turbid plumes moving to the east and potentially impacting upon the extensive and valuable intertidal and subtidal rocky reefs around Lookout Point. DPI recommends an additional monitoring site be established as described.

Response

An additional monitoring site will be deployed south of Lookout Point during the dredging phase.

Issue

Monitoring parameters

Table 9.8 Proposed Environmental Limits and Trigger Values for turbidity at CB1 and MU1 indicates that limits will be expressed as Total Suspended Solids in terms of milligrams per litre (mg/L). However, mg/L is usually a laboratory measure whereas NTU is used for field based sampling. Clarification is required as to which measurement will be used and the intended protocol for conversion of measured NTU to mg/L, if this is proposed. If the real-time turbidity monitoring is to be undertaken using NTU then the limits, triggers and management responses should be specified using this measurement.

Response

Analysis of the baseline water quality data has confirmed that real-time turbidity monitoring will be undertaken using optical sensors that measure turbidity in NTU. The trigger vales for CB1 and MU1 will be recalculated using a conversion factor that is based on a correlation factor between TSS and NTU. As the existing baseline water quality data shows poor correlation between the NTU and TSS measurements, an additional study has been commissioned to derive an NTU/TSS correlation using sediment and seawater collected from the proposed dredge area at Eden.

Issue

Monitoring triggers

Section 9.1.5.2 proposes that triggers will be based on the daily calculated mean (or median) based on 24 hours of measurements at 30 minute intervals. If for instance 12 hours is allowed for collection of the 48 sample results and calculation of the mean, this effectively means that up to 36 hours may have elapsed since a significant turbidity plume began to be generated. Additionally, Table 9.8 proposes allowing an additional 24 hours for validation of equipment and data accuracy.

Effectively this may mean that no response is initiated until 50 hours after an exceedance was first detected. A more robust approach would be for triggers to be based on an average over a few hours or a rolling 24 hours. Although there might be a greater risk of false exceedances with such an approach, the monitoring plan should make provision for the commencement of an investigation into short term (a few hours) exceedances to determine if an adverse effect is indeed occurring and enable a rapid response if required.

Response

Where short term consecutive readings e.g. 4 x 30 minutes are above a trigger, validation of the data will be undertaken as quickly as possible. This will entail a number of system checks to identify whether the issue is related to a fault with the sensor or a communication error with the telemetry. If the elevated readings are due to a sensor issue, a team will be mobilised to site within 24 hours to rectify the fault.

If the data are shown to be accurate and the exceedances are not shown to be related to natural fluctuations (by comparison to the reference site) the dredging contractor is required to immediately implement corrective actions and notify the Department of the actions taken.

A formal trigger will occur when the 24 hour rolling median exceeds the Level 1 Response Level.

4.4.3 Mitigation Measures

Issue

In the event that the project is approved, DPI recommends the following additional safeguards/mitigation measures to be specified in the approval:

- *Spill kits to include Hydrocarbon booms to facilitate the containment of any water based spills.*
- *Sleeves to be fitted over hydraulic hoses on equipment operating on or adjacent to the waterway to capture any hydraulic fluid that may be spilt from a ruptured hose.*

Department of Industry – Lands supports the inclusion of the Proposed Mitigation Measures from the EIS into any approval of the application.

Response

In relation to the support of the EIS mitigation measures, it is assumed that DPI refers to its support rather than "Department of Industry – Lands".

In relation to the sleeves, the Department considers it not acceptable for it to apply to land based plant operations.

Subject to the above proposed amendments, the additional safeguards/mitigation measures are considered acceptable and will be included in the CEMP.

4.4.4 Algal Bloom

Issue

The potential exists for the dredge operation to trigger a toxic algal bloom like that currently happening in the area. The dinoflagellates (Alexandrium spp) that recently bloomed in the bay can produce resting cysts when the bloom crashes. These cysts can remain dormant for years (decades) until something triggers them to germinate. This genus produces paralytic shellfish toxins (e.g. saxitoxin) that can result in the closure of a number of seafood industries. The current event may have impacted on mussel, abalone, prawn and lobster harvest.

It is important that the project team continues to work with the local seafood industry to mitigate any potential impacts. DPI is aware that the proponents have engaged a consultant to advise on this issue and are satisfied with the work undertaken so far.

Response

An assessment of available information regarding the incidence of algal blooms along the NSW coastline has confirmed that *Alexandrium* has been present in NSW waters since 1945. Pollard and Rankin (2003) also confirmed the presence of *Alexandrium* sp. in plankton tows from Twofold Bay as well as cysts in sediments sampled from a number of sites within Twofold Bay. The trigger to germinate is believed to be caused by a number of environmental factors but cannot be predicted with confidence. The desktop review undertaken by Jacobs (2017b) also confirmed there have been no

studies that have demonstrated a link between dredging and the occurrence of algal blooms which also concluded that dredging constituted a low risk (refer Appendix E).

4.5 Transport for NSW

TfNSW advised that it had reviewed the documentation and had no comments on the Project. The submission is noted and no further response is required.

4.6 Bega Valley Shire Council

4.6.1 Monitoring of Plans and Measures

Issue

We wish to restate the key importance of a range of subsequent plans and documents such as CEMP's as mitigation measures listed in the EIS. It is essential that the responsibilities for oversight and monitoring of these plans and measures are clearly identified by way of nominated position/agency in the final Development Approval Conditions.

Response

The submission is noted and no further response is required.

4.6.2 Whale Migration and Behaviour

Issue

The impact of the proposal on whale migration and behaviour is still of concern and Council acknowledges that this impact is dependent on the final timing of piling and dredging works. Further the impact on marine mammals may not truly be known until works begin and the ranges of comprehensive mitigation measures are tested. We would suggest that there are distinct windows of opportunities for the dredging and disposal (and related ship movement) activities in particular to occur outside of the bi-annual whale migrations and approvals be expedited to allow works to begin as soon as possible in order to provide flexibility in the timing of works.

Response

Potential impacts from underwater noise generated by construction activities such as dredging and disposal and piling and related ship movements will be carefully managed in accordance with the project specific EPBC referral conditions, the Sea Dumping Permit and the *Underwater Piling Noise Guidelines* (DPTI 2012). This includes, but is not limited to adopting safety zones for the duration of the piling activities and adopting increased safety zones where piling is undertaken during the southward whale migration period between September and November (inclusively). The management measures will be confirmed once the EPBC referral conditions are finalised by DoEE and will be incorporated into the CEMP.

4.6.3 Dredging/Spoil Disposal

Issue

- *That options for dredge to barge transfer of sediments be considered as part of Dredging Option 3 Partial Double Handling Method, to reduce turbidity and sediment plumes associated with the dumping of dredged material within the dredging footprint.*
- *That Cocora and Cattle Bay Beaches be monitored during dredging works and should sediment plumes impact nearshore waters, advisory signage be placed on beaches providing temporary closures. Placement of signage will be responsibility of contractors.*
- *Following completion of the project that consideration be given to the shallow dredging of sediments adjoining Cocora and Cattle Bay Beaches to remove any sediments that may have accumulated during dredging and disposal works.*

Response

Option 3 involves the TSHD removing most material, with the BHD being used in areas containing hard rock materials or inaccessible to a TSHD. Material dredged by the BHD would be loaded into hopper barge(s) and bottom dumped in deep water within the dredging footprint in an area accessible by the TSHD. Dredged material would be delivered to the offshore disposal site by the TSHD. Jacobs (2017a) modelling results indicate that exceeding 25mg/L above ambient (i.e. the "cease work" trigger) is a relatively rare occurrence (less than 0.5% of the time for the "hindcast" case) for Option 3.

Sediment plumes will be monitored at Cattle Bay (monitoring site CB1) and near Cocora Point (monitoring site MU1) as part of the proposed water quality monitoring program. Modelling indicates that plumes will not impact nearshore waters and beach closures should not be required. In the unlikely event that closure is required, the placement of signage will be the responsibility of the construction contractors.

The modelling predicts negligible sedimentation adjacent to the dredge footprint (1-5mm) and no sedimentation outside the dredging footprint including the Cocora or Cattle Bay beaches.

4.6.4 Noise

Issue

- *That a Construction Noise and Vibration Management Plan be developed as recommended by the EIS.*
- *That affected acoustic receiver's as identified within the EIS be included in a project communications contact list (email / newsletter), to provide regular updates on the timing and extent of major noise generation works.*

Response

As documented in the EIS, a CNVMP will be developed by the contractor. As outlined in Section 4.6.9, instead of a specific notification protocol, it is proposed that regular updates of the construction phase of the project are made available online. This includes potential environmental impacts that may arise throughout the timeframe of the construction phase.

4.6.5 Marine Algae Sensitive Marine Environments

Issue

- *That marker buoys be deployed to mark no go areas with regard identified sensitive marine environments within the Cattle Bay / Snug Cove precinct.*

Response

A map of the project site including an outline of the varying construction zones and nearby vulnerable marine areas is shown in Figure 5-4 of the EIS. The construction mooring zone is also outlined in Figure 5-4, which outlines the specific area in which construction vessels are allowed to anchor in. Anchoring outside of the construction zone is prohibited throughout the construction phase of the project. The establishment of a construction mooring zone ensures sensitive marine habitats are protected. Buoys equipped with navigation lights will be installed along the boundary of the construction and mooring zones when required by the PANSW Harbour Master.

4.6.6 Servicing

Issue

- *That the project manager meet with Bega Valley Shire Council's Manager of Water and Waste Water, as soon as practical to determine requirements for accessing Council's reticulated water supply network and post construction impacts on capacity of Snug Cove infrastructure to handle increased waste loads on public or private toilet facilities as part of cruise ship visitation.*

Response

Advisian's design engineer has previously had discussions with BVSC in relation water services. Further consultation will be undertaken in due course with regard to proposed water and wastewater services. It is noted that the design of water services to the Breakwater Wharf is currently ongoing.

4.6.7 Monitoring and Auditing of Construction Management Plans

Issue

- *For each proposed CMP or environmental monitoring program listed as mitigation measure in the EIS, that a specific State Agency or Officer be nominated for the responsibility of auditing each mitigation measure.*

Response

As stated in the CEMP, routine reporting and auditing will be undertaken throughout the duration of implementation of the CEMP. The CEMP sets out the reporting and monitoring required during construction, and includes the content, recipient and frequency of reporting. All reports will be made available by the Department to regulators upon request.

Additionally, an Environmental Representative (ER) will be appointed for the Project who will have the responsibility for providing surveillance of the Contractor's implementation of environmental controls, monitoring programs, inspections and audits and undertaking audits of the Contractor's compliance with the Contractor's EMP and sub-plans as outlined in the CEMP.

As stated in the CEMP, external audits and inspections of the Project may be conducted by regulators to confirm compliance with the SSI Instrument of Approval, permits and licences.

4.6.8 Impact of Heavy Vehicles

Issue

Council does not support the use of the nominated route of Imlay Street between Mitchell Street roundabout and Albert Terrace for the following reasons:

- *The impacts on public safety and amenity to pedestrians, vehicles, residents and business owners through the CBD of Eden from the increase in numbers of heavy vehicles during the 59 week construction period. The Eden Public School is also situated on Imlay Street between Mitchell Street and Bass Street and the increase in heavy vehicle traffic particularly during mobilisation/de-mobilisation and concrete pours increases risks to local students, parents and school bus movements. The CBD is an area of high pedestrian and light vehicle movement activity. The increase in and sustained volume of heavy vehicles associated with construction activities, is incompatible with the activities and traffic conditions within the CBD precinct.*
- *The impacts on Council road infrastructure particularly for the newly constructed $1.3m CBD Streetscape and pavement along Imlay Street between Bass Street and Chandos Street. The estimated number of heavy vehicles ranging from 6.4m light rigid through to 19m semi and truck and dog combinations was not allowed for during the original pavement design completed some 2 years ago. The increase in heavy vehicles and equivalent standard axle loadings is anticipated to significantly shorten the 20 year design life of the road pavement and damage the asphalt surfacing and underlying lightly bound pavement. It could be anticipated that pavement rutting, deformation and cracking is likely to occur from such a sustained period of heavy vehicle activity. It is estimated over the proposed 59 week construction schedule that estimated 2,500-3,500 additional heavy vehicles are likely over normal conditions. Further, as part of the CBD Streetscape beautification of Imlay Street between Bass and Chandos Street, kerb blisters and kerbside landscaping features have been installed that now change the horizontal geometry for swept path movements that may be incompatible with larger heavy vehicles. It could be anticipated that damage to kerb blisters or kerbside landscaping features may be sustained during turning movements.*

Response

In summary, the two points of concern raised by BVSC are:

- Impacts to pedestrian safety and amenity.
- The potential damage to Imlay Street that may occur during the construction phase of the project due to increased construction vehicle movements.

As described in Section 9.5.4 of the EIS, various mitigation measures have been proposed to ensure minimal impacts from land based construction traffic activities including impacts on pedestrian safety and amenity. Such measures include the preparation and implementation of a CEMP and a Construction Traffic and Access Management Plan (CTAMP) (refer to Appendix D of the EIS). Further details of proposed traffic, transport and access mitigation measures are outlined in Section 7.7 of the CEMP.

Damage to the upgraded section of Imlay Street may occur due to such factors as truck size and weight and also the frequency of truck movements. As outlined in the EIS (refer to Section 9 for further

information), construction vehicles transporting material to and from the project site using Imlay Street in the Eden Town Centre will be capped at a 20 – 22 gross tonne weight.

Section 4.6.9 below provides a detailed response to BVSC's proposed alternative access options.

4.6.9 Alternative Access Options

Issue

Council proposes the following alternative access options with conditions:

For Heavy Rigid, 19m semi, 19m truck and dog combinations

- *Mitchell Street between Princes Hwy roundabout and Calle Calle Street*
- *Calle Calle Street between Mitchell and Chandos Street*
- *Chandos Street between Calle Calle Street and Imlay Street*
- *Imlay Street between Chandos Street and Albert Terrace*

For Medium Rigid and Light Rigid

- *Mitchell Street between Princes Hwy roundabout and Calle Calle Street*
- *Calle Calle Street between Mitchell and Museum Street*
- *Museum Street between Calle Calle Street and Albert Terrace*

As per the original proposed route for Light rigid, medium rigid, heavy rigid, 19m semi and 19m truck and dog combinations:

- *Albert Terrace between Imlay Street and Weecon Street*

Whilst on Council local roads the following conditions apply:

- *Any oversize/overmass or Performance Based Standards permits required during the period of construction shall be submitted to the National Heavy Vehicle Regulator (NHVR) for approval*
- *Where any part of the vehicle, including its load or any equipment, exceeds 4.9m in height, approval must be obtained in writing from the following third parties before travel commences:*

  1} Essential Energy This approval must be obtained and complied with in addition to any other clearance requirements in force along the route.

- *For any over-dimension loads, all residential properties along the route are to be notified of the planned vehicle movements at least 3 working days before commencement.*
- *Vehicles must remain on the sealed section of carriageway for the entirety of its journey when practical.*
- *Trucks must enter and leave the Snug Cove site in a forward direction only.*

- *Exhaust brakes should not be used in built up areas.*
- *For any over-dimension loads, (Two) <2> additional Pilot vehicles to accompany the permit vehicle from the Mitchell Street/Princes Hwy Roundabout to the construction site at Snug Cove.*
- *For all heavy vehicles, travel is only permitted during daylight hours*
- *For all construction traffic, travel is only permitted between the hours of:*

  7 am - 6 pm Man - Fri,

  8 am -1 pm Saturdays,

  No travel on Sundays and public holidays.

Response

A review of the alternative access options outlined in BVSC's submission has been reviewed by McLaren Traffic Engineering (refer to Appendix F).

McLaren Traffic Engineering (2017) found that at multiple points, the swept path of a 19m semi-trailer/articulated and 18.7m truck and dog HRV construction vehicle either passes over the kerb, roundabout refuge or median separator (for exact route locations refer to Annexure B of Appendix F). For instance, the suggested left turn from Princes Highway onto Mitchell Street was found to be unsuccessful as vehicles pass over either the kerb or roundabout refuge. Egressing from the site, the vehicle also passes over the kerb and roundabout refuge when turning right onto the Princes Highway from Mitchell Street. Also egressing from the site, vehicles pass over the medium separator when turning left from Calle Calle Street onto Mitchell Street. Lastly, it was found that the road width was not adequate for heavy vehicle movement when continuing onto Museum Street from Calle Calle Street.

Due to the number of unsuccessful truck movements assessed by McLaren Traffic Engineering, the following factors have been considered in the identification of the alternative construction routes:

- Turning movements to / from the Princes Highway from side roads that affect vehicular traffic flow along the Princes Highway (requiring vehicles to stop due to vehicles requiring the full width of the roadway) were not considered as an appropriate construction route.
- Two-way passing on Calle Calle Street / Museum Street is to be achieved without the use of any traffic controllers.
- Bungo Street appears to have reduced sight lines for heavy vehicles to manoeuvre left / right onto the Princes Highway.

The use of Imlay Street for construction vehicles was identified as a potential route in the EIS subject to restricting the maximum load of construction vehicles to 20-22 tonnes to reduce damage to the upgraded road in the Eden Town Centre. The proposed construction routes are alternative routes for construction vehicles.

McLaren Traffic Engineering concluded that the route outlined in the EIS and their alternative construction routes are viable options as follows:

> *"Utilising the construction route outlined in the EIS (using Eden Town Centre) would have an impact on parking manoeuvres and pedestrian safety. The alternative construction routes*

outlined in Table 2 above, would have a larger impact on residential amenity in terms of acoustics and less impact on pedestrian safety.

The estimated number of construction movements per day is 4 (2 in, 2 out) truck movements outside of mobilisation, demobilisation and concrete pours as outlined in the EIS. This level of traffic is low and will have minor to nil impacts on pedestrian safety, traffic flow, and residential amenity. Hence, the construction routes outlined within the EIS and the alternative routes within this letter are both sufficient to accommodate construction vehicles in terms of the traffic flow, pedestrian safety, and residential amenity outside of mobilisation, demobilisation and concrete pours.

The peak estimated number of construction movements occurs during concrete pours with a peak of 50 (25 in, 25 out) truck movements per day. Typically, during concrete pours trucks will have a staggered arrival but arrive over a shorter period. For this reason, it is recommended that during concrete pours trucks use the alternative proposed route outlined in this letter to avoid Eden Town Centre. It should be noted that concrete pours do not occur every day and cannot be avoided for this type of construction."

Local Roads Conditions

The above proposed conditions outlined by BVSC will be adopted into the Contractor's CEMP and the CTAMP for the construction phase of the Project except for the following:

- As dredging of the Project site is proposed to continue 24 hours a day, 7 days a week, some heavy vehicles may need to travel outside of the construction travel timeframes proposed by BVSC and during night time hours to accommodate this particular phase of the Project.
- In relation to notification protocol to give awareness to affected residences along construction vehicle routes, it is proposed that regular updates of the construction phase of the Project will be made available online with details on expected heavy vehicle movements through Eden. An adequate website to display such is the Department's website. A frequent communication protocol to community liaison groups will also be established.

4.6.10 Disability Access

Issue

Council's Access Advisory Committee has requested that any design has regard to access for persons with a disability to and from any berthed ship.

Response

As outlined in Section 6.2.10 of the EIS, the Project design is consistent with the requirements of the *Disability Discrimination Act 1992* (DDA) and the Disability Standards for Accessible Public Transport 2002 which is formulated under the DDA.

5 Organisations and Private Stakeholder Submissions

This section responds to the submissions received from organisations and private stakeholders. A response to each of the issues identified by the respective submissions is provided below.

5.1 Svitzer Australasia

Svitzer Australasia did not raise any major issues for the Project, summarised from the extract of their submissions as follows:

> *"On review of elements of the extensive and well referenced EIS and support documentation, Svitzer does not see any major issues as a neighbor and port user in relation to Environmental issues such as noise pollution, air quality, hydrology, etc. Svitzer does not see any major operational issues in relation to disruption of its operations in the port during construction phases, and has already been in consultation with the Project managers to co-ordinate its activities."*

The submission is noted and no further response is required.

5.2 Port of Eden Marina

Issue

POEM is a non profit community association formed about 5 years ago to promote investment and employment in Eden through the development of a marina in Snug Cove. The size of the berthing pocket for the cruise ships will have an impact on the viability of the Safe Harbour/Marina project as it will limit the area available for the marina attenuator. A compromise has been agreed with Sydney Ports and Crown Lands that a berthing pocket for the ships will be no greater than 160m wide. It has been agreed that the attenuator can be placed at the bottom of the dredge batter, leaving a 160 m pocket. Under these conditions, POEM fully supports the Eden Wharf extension project. We note that some of the EIS diagrams show a Cattle Bay marina licensed area. We have been advised that this license expired on 30 June 2016.

Response

The following key facts of the Project have been highlighted below in response to the above submission.

The Department is responsible for the delivery of the Eden Breakwater Wharf Extension Project. The Department is providing project management and technical support alongside Transport for NSW for the Eden Safe Harbour Project. In response to the above submission, it should be noted that the scope of the Eden Safe Harbour Project does not include a marina nor has a development application for a marina in Snug Cove been formally submitted. The Eden Safe Harbour Project is still in the planning phase and the project scope, including the location of the proposed wave attenuator, has not yet been finalised.

Further, the project interfaces are well understood by the NSW Government and were investigated in early 2016 by a Gateway Health Check and a Gateway Review (Gate 2) coordinated by Infrastructure

NSW and in accordance with the NSW Gateway System. A Project Steering Committee has been established to provide strategic oversight over both projects. The Project Steering Committee includes industry experts and senior representatives from Infrastructure NSW, Transport for NSW and Department of Industry. It is important to note that consultation with POEM, relevant stakeholders and the community is ongoing in relation to both projects. A major conclusion of such involvement is that the Department and TfNSW are committed to the delivery of both projects for the greater benefit to Eden.

It has been established that the licence once held upon Cattle Bay Marina has expired. The extent of the previous Cattle Bay Marina Lease was shown in the EIS for historical purposes only.

5.3 Steve Heffernan

Steve Heffernan supports the Project as follows:

> *"I cannot see any detrimental impacts of this project on the local environment especially with the level of environmental management and scrutiny applied and I wholeheartedly, strongly support this development."*

The submission is noted and no further response is required.

5.4 Richard Lamacraft

Issue

In section 4.1 the EIS discusses the alternative solutions. One obvious one that has been missed is to berth the cruise ships on dolphins at the end of the breakwater with a short wharf and access along the top of the breakwater. The orientation of the berthing arrangements would be similar to the old tanker mooring arrangements that were removed in the early 2000's. The berthed ships would face into any penetrating ocean swell. This solution would greatly reduce or possibly eliminate dredging requirements and is likely to be far cheaper. Additionally any wave attenuator associated with the safe harbour project would be less constrained.

Response

Vessels berthed using the arrangement described would be subject to swell wave conditions as there would be no protection from swell waves afforded to the berthing area. Despite the swell waves being "head on" with ships facing into the penetrating ocean swell, PANSW and the cruise ship operators have raised concerns over the exposure of vessels to swell conditions under the other berthing arrangements considered and described in the EIS. The facility would need to be operational under most weather conditions, and the berthing of large cruise vessels using the arrangement described above would reduce the frequency at which vessels would be able to berth safely, due to the exposure of the berth to swell waves. Vessel mooring lines would likely be subject to excessive forces, due to the action of the swell waves.

For these reasons, this berthing arrangement was not considered as a feasible option for analysis.

The proposed berthing arrangement has been developed on the basis of a Value Optimisation Study early in the design process, which considered six different berthing arrangements, and ranked them in terms of cost, functionality, constructability, duration of construction, environmental, social and user safety to arrive at the proposed configuration. In addition, the current design configuration was subject

to a number of other developments during the concept and detailed design phases. These developments are summarised below:

- Value engineering ideas.
- Client and other party comments.
- Further site investigations.
- Further development and detailing of the design.
- Contractor's recommendations.

5.5 Name withheld

A public submitter supports the Project as follows:

> *"The extension of the Breakwater Wharf will hopefully bring the return of commercial vessels other than the passenger ships. Commercial vessels utilise a number of businesses and industries resulting in a financial and employment boost for the area as a whole, not just Eden. I am fully in favour of the proposed wharf extension."*

The submission is noted and no further response is required.

6 Summary of Proposed Mitigation Measures

As described in Section 10.4.1 of the EIS, each Contractor will develop their own Project specific Environmental Management Plan (EMP) to manage the environmental risks specifically related to their scope of work on the Project. These Contractor documents must be developed to align with the CEMP as a minimum. The CEMP will be required to incorporate the relevant requirements and conditions from the following documents, licences and permits once all developed and issued by the responsible authority:

- Submissions Report for the Project to be prepared following public exhibition of the EIS.
- State Significant Infrastructure (SSI) Instrument of Approval issued by DP&E under Section 115ZB of the EP&A Act.
- Environmental Protection Licence (EPL) for '*water-based extractive activity*' to be issued by the EPA under the *Protection of the Environment Operations Act 1997* (POEO Act).
- Sea Dumping Permit issued by DoEE under the *Environment Protection (Sea Dumping) Act 1981*.
- Requirements of the determination by DoEE in relation to a referral made under the EPBC Act.

For ease of reference, all mitigation measures listed in the EIS, as well as additional measures described in the RTS, are summarised in Table 6-1:

- Amended measures are marked with an asterisk (*) with those measures (or parts thereof) no longer proposed shown in strikethrough (~~strikethrough~~) and new text shown in *italics*.
- New mitigation measures are marked with double asterisks (**) with new text shown in *italics*.

Table 6-1 Summary of proposed amended mitigation measures

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
1.01	Water Quality	Inspection of all construction equipment and vessels by qualified personnel prior to commencement of work, to reduce the risk of hydrocarbon spills or leaks.	Construction	9.1.3
1.02	Water Quality	Timing of works should be planned to avoid, where possible, periods of high rainfall or during storm/wind warnings. Where this is not possible, preparation and tidying should occur around the worksite to reduce the potential for contamination of the waterway from stormwater runoff.	Construction	9.1.3
1.03	Water Quality	Hopper barges for dredged material will not be overloaded to prevent spillage of dredged material while being transported offshore.	Construction	9.1.3
1.04 *	Water Quality	Containment *measures are to be utilised to* ~~of the work~~ *minimise spillage* ~~area to prevent contamination of water by materials~~ associated with pile replacement or repair, grouting, and concreting.	Construction	9.1.3
1.05	Water Quality	Waste management as per measures described in Section 9.18 to reduce the likelihood of rubbish and	Construction	9.1.3

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
		construction materials entering the waterway.		
1.06	Water Quality	The Department shall notify the aquaculture permit holder(s) at least one week prior to commencement of any dredging related activities that may result in the disturbance of any sediment.	Construction	9.1.3
1.07 *	Water Quality	DPI-Fisheries (1800 043 536) shall be immediately notified of any fish kills *within the site* ~~in the vicinity of the construction works~~. In such cases, all works other than emergency response procedures are to cease until the issue is rectified and written approval to proceed is provided by DPI-Fisheries.	Construction	9.1.3
1.08	Water Quality	To avoid the disruption to the operations at the Cattle Bay mussel farm from the risk of the dredging and construction works that may impact on water quality in Twofold Bay, the Department and Eden Sea Farms in accordance with the Deed of Settlement and Release agrees for the temporary relocation of the Cattle Bay Mussel Farm (lease No. AL07/098 and AL08/098) to a predetermined location pursuant to Lease No. AL06/001 in Twofold Bay.	Construction	9.1.3
1.09	Water Quality	Water quality monitoring to be conducted in accordance with the CEMP, which includes appropriate trigger levels and a tiered management response depending on the trigger levels reached (Appendix D).	Construction	9.1.3
1.10	Water Quality	Portable toilets to be emptied on a regular basis and human waste disposed of to a local sewage treatment plant.	Construction	9.1.3
1.11	Water Quality	Establish comprehensive vessel/ship refuelling procedures to avoid or reduce the possibility of release. Include as a minimum requirements for: • Adhering to all PANSW and pollution regulations • Refuelling during daylight hours where possible, depending on sea conditions • Training personnel involved with refuelling or fuel transfer in their roles, functions and responsibility, including emergency response • Maintaining open communication channels • Deploying spill prevention systems in accordance with established procedures and regulatory requirements • Maintaining emergency response equipment to ensure that it is readily available	Construction	9.1.3
1.12	Water	Spill response kits located around the construction site,	Construction	9.1.3

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
	Quality	on the passenger wharf and on-board construction and dredging vessels.		
1.13	Water Quality	The existing dedicated oil spill recovery area at the landward end of the Breakwater Wharf, containing spill containment booms, chemical absorbent materials and dispersants shall be maintained and operated by PANSW.	Construction	9.1.3
1.14	Water Quality	Environmentally Friendly/water based drilling muds to be used for pile drilling activities.	Construction	9.1.3
1.15	Water Quality	Industry standards, PANSW and pollution prevention regulations shall be adhered to during refuelling, transfer, storage and handling of hazardous materials.	Construction	9.1.3
1.16	Water Quality	The lowest level of hydrocarbons (oil, grease, petrol, diesel) practicable will be stored on site.	Construction	9.1.3
1.17	Water Quality	Bunding of chemical storage areas on board construction and dredging vessels, and land-based construction areas.	Construction	9.1.3
1.18	Water Quality	Vessels shall have adequate on-board communication, containment, drainage and monitoring systems to prevent discharges of unauthorised effluents.	Construction	9.1.3
1.19	Water Quality	Containment of spills and leaks in accordance with the technical guidelines section Bunding and Spill Management of the Authorised Officers Manual (EPA 2012) and the most recent version of the Australian Standards in the guidelines. Containment should be designed for no discharge.	Construction	9.1.3
1.20	Water Quality	Appropriate site and project inductions/training detailing the potential water quality impacts and relevant construction measures and spill and emergency response procedures.	Construction	9.1.3
1.21 *	Water Quality	Spill response strategy and procedures should include the contact details of the relevant authorities to be notified in the event of a spill, including the PANSW: Harbour Master/Pilot, PANSW Port of Eden Main Jetty, Eden NSW 2551 T: +61 2 6496 1719 *M: 0438 374 034* E: edenpilots@portauthoritynsw.com.au W: http://edenport.com.au/contact_us	Construction	9.1.3

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
1.22	Water Quality	Appropriate waste facilities should be readily accessible on the passenger wharf to encourage passengers to dispose of waste correctly.	Operation	9.1.4
1.23	Water Quality	Regular inspection and clearing of marine debris from waters, land-side, adjacent to the cruise ship berth and along the foreshore should be undertaken by management and / or subcontractors. The regular inspection should also include a periodic inspection of the seabed to remove any accumulated rubbish.	Operation	9.1.4
1.24	Water Quality	Use of water sensitive urban design measures.	Operation	9.1.4
1.25	Water Quality	Educate employees of the cruise ship terminal on best practice for washing of wharf / land based facilities. Where possible, rinse with water only or use detergents with low-phosphate content;	Operation	9.1.4
1.26	Water Quality	In-water cleaning to occur only on anti-fouling coatings suitable for in-water cleaning (obtainable from coating manufacturer);	Operation	9.1.4
1.27	Water Quality	Best practice hull cleaning procedures (where required) to be followed (e.g. Department of Agriculture, Fisheries and Forestry (DAFF) Anti-fouling and In-water Cleaning Guidelines, 2013, and the ANZECC Code of Practice for Antifouling and In-Water Hull Cleaning and Maintenance 1997).	Operation	9.1.4
1.28	Water Quality	Prevent/minimise sewage pump-out by docked passenger ships.	Operation	9.1.4
1.29	Water Quality	Oils and hazardous chemicals should be stored in bunded and covered storage areas.	Operation	9.1.4
1.30	Water Quality	To limit the resuspension of seabed sediments, appropriate speed zones should be enforced.	Operation	9.1.4
1.31	Water Quality	Ongoing periodic monitoring of water quality and surface sediments.	Operation	9.1.4
1.32	Water Quality	Establish comprehensive vessel/ship refuelling procedures to avoid or reduce the possibility of release. Include as a minimum requirements for: • Adhering to all PANSW and pollution regulations • Refuelling during daylight hours where possible, depending on sea conditions • Training personnel involved with refuelling or fuel transfer in their roles, functions and responsibility, including emergency response, • Maintaining open communication channels	Operation	9.1.4

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
		• Deploying spill prevention systems in accordance with established procedures and regulatory requirements • Maintaining emergency response equipment to ensure that it is readily available.		
1.33	Water Quality	Low EHS-risk cleaning products will be preferentially selected (i.e. biodegradable detergents and dispersants).	Operation	9.1.4
1.34	Water Quality	Vessels shall have adequate on-board communication, containment, drainage and monitoring systems to prevent discharges of unauthorised effluents.	Operation	9.1.4
1.35	Water Quality	The use of any surfactants, dispersants and detergents will be restricted to the minimum amount required to complete tasks.	Operation	9.1.4
1.36	Water Quality	Prohibit discharge of contaminated bilge water into the waterway.	Operation	9.1.4
1.37	Water Quality	In NSW State waters, Transport for NSW is responsible for ensuring that maritime incidents (including oil and chemical spills) are responded to quickly and effectively. At the Port of Eden, the PANSW (Sydney resources) is the lead response agency. Containment of spills and leaks in accordance with the technical guidelines section Bunding and Spill Management of the Authorised Officers Manual (EPA 2012) and the most recent version of the AS in the guidelines.	Operation	9.1.4
1.38	Water Quality	Containment should be designed for no discharge.	Operation	9.1.4
1.39 *	Water Quality	Spill response strategy and procedures should include the contact details of the relevant authorities to be notified in the event of a spill, including the PANSW: Harbour Master/Pilot, PANSW Port of Eden Main Jetty, Eden NSW 2551 T: +61 2 6496 1719 *M: 0438 374 034* E: edenpilots@portauthoritynsw.com.au W: http://edenport.com.au/contact_us	Operation	9.1.4
2.01	Sediment Quality	Ensure fuel handling, bunkering and emergency procedures and equipment are appropriate, available and considered standard in the Port's and contractors procedures. Adequate equipment and facilities will be	Construction and Operation	9.2.2 & 9.2.3

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
		available on board and at the wharf during construction. Ensure relevant staff and contractors are trained in emergency response.		
2.02	Sediment Quality	Best practice hull cleaning procedures (where required) to be followed (e.g. Department of Agriculture, Fisheries and Forestry Anti-fouling and In-water Cleaning Guidelines, 2013).	Construction	9.2.2
2.03	Sediment Quality	Appropriate general waste handling and disposal processes in contractor's policies and procedures.	Construction	9.2.2
3.01	Aquatic Ecology	To minimise damage to sensitive marine habitats (seagrass and subtidal rocky reef) in the immediate construction area, Snug Cove and Cattle Bay, all construction vessels must avoid anchoring over areas of sensitive habitat including mapped seagrass beds and areas of subtidal rocky reef. Vessels must only anchor (except in the case of emergencies) in areas marked as a dedicated mooring zone for construction vessels on the Figure 5-4 of the EIS.	Construction	9.3.3
3.02	Aquatic Ecology	To minimise unnecessary damage to marine habitats Contractor(s) must limit any unnecessary / temporary construction (i.e. through selection of the most appropriate construction methods) and limit any anchoring which is required by vessels. Any temporary barge / platform structures along the breakwater must be positioned so as to minimise physical disturbance of macroalgae.	Construction	9.3.3
3.03	Aquatic Ecology	All construction works must be undertaken by suitably qualified and experienced Contractor(s) to reduce the risk of error and accidental environmental damage.	Construction	9.3.3
3.04	Aquatic Ecology	To reduce the potential impacts of water quality on marine habitats during construction and operation, all mitigation measures outlined in Section 9.1 (Water Quality) of the main EIS must be adopted.	Construction / Operation	9.3.3
3.05	Aquatic Ecology	To reduce the potential impacts of sediment quality on marine habitats during construction and operation, all mitigation measures outlined in Section 9.2 (Sediment Quality) of the main EIS must be adopted.	Construction / Operation	9.3.3 & 9.3.4
3.06	Aquatic Ecology	To enhance the potential for contractors to be able to assist in the protection of marine habitats (especially seagrass, macroalgae and rocky reef areas) in the study area, all contractors, in particular skippers, must be made aware of the areas of sensitive habitat within the study area and of the potential impacts that construction works may have on these areas.	Construction	9.3.3

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
3.07	Aquatic Ecology	A turbidity curtain with a minimum drop of 4m must be used locally around the perimeter of pile drilling works to limit the spread of plumes generated by drilling activities. Drilling spoil and cuttings must be deposited at seabed level within the footprint of the new wharf and contained within the turbidity curtain.	Construction	9.3.3
3.08 *	Aquatic Ecology	Monitoring of water quality (particularly turbidity) during *dredging* ~~construction~~ should be undertaken and dredging operations ceased if levels of suspended sediment become higher than trigger values developed for the Project.	Construction	9.3.3
3.09	Aquatic Ecology	Due to the nature of the Project there is no way to mitigate the direct impact of dredging on soft sediment habitats within the dredge area.	Construction	9.3.3
3.10	Aquatic Ecology	Post construction surveys of marine vegetation (i.e. seagrass and macroalgae) should be undertaken to determine the degree of damage and recovery of benthic habitats in the study area.	Post-Construction	9.3.3
3.11	Aquatic Ecology	To minimise damage to marine habitats in the study area which may be utilised by marine fauna, all measures listed under 'Marine Habitats and Flora' above to protect marine habitats must be adopted.	Construction / Operation	9.3.3 & 9.3.4
3.12	Aquatic Ecology	To reduce potential water quality impacts on marine fauna during construction and operation all measures listed in Section 9.1 of the main EIS (Water Quality) must be adopted.	Construction / Operation	9.3.3 & 9.3.4
3.13	Aquatic Ecology	To reduce potential sediment quality impacts on marine fauna during construction and operation all measures listed in Section 9.2 of the main EIS (Sediment Quality) must be adopted.	Construction / Operation	9.3.3 & 9.3.4
3.14	Aquatic Ecology	To reduce the potential impacts of marine debris on marine fauna, waste associated with construction and operation must be managed as per Section 9.18 of the main EIS (Waste Management). In addition, all ships at sea must adhere with the amendments to the International Maritime Organisation's (IMO's) International Convention for the Prevention of Pollution from Ships (Marine Pollution: MARPOL) Annex V which came into force on 1 January 2013. The amendments prohibit the discharge of all garbage from ships into the sea (except under very specific circumstances). This reverses the presumption that garbage may be discharged into the sea based on	Construction / Operation	9.3.3 & 9.3.4

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
		defined distances from shore and the nature of the garbage. The amendments also list requirements for garbage management plans on ships and port reception facilities for receiving waste. MARPOL is implemented in Australia through the Protection of the Sea (Prevention of Pollution from Ships) Act 1983.		
3.15	Aquatic Ecology	To reduce the potential for lighting related impacts on marine fauna the following measures should be adopted: • Limit the need for construction activities to be undertaken during the evening and night time to reduce the overall need for construction related artificial lighting (on vessels and on the land portion of the site) and associated impacts. • The use of sensor lighting or dimmers on the wharf to reduce brightness during times of night when the facility is less likely to be in use.	Construction / Operation	9.3.3 & 9.3.4
3.16	Aquatic Ecology	If possible, the risk of overnight cable strike can be minimised by placing floating plant on a swing mooring, where space permits and it is deemed safe to do so by the vessel Master, rather than leaving plant in a fixed mooring configuration as the reliance on a single swing mooring line will minimise cable oscillation.	Construction	9.3.3
3.17	Aquatic Ecology	The risk of vessel strike during construction and operation may be reduced through the adoption of: • All vessels associated with dredging and construction will travel at speeds no higher than 10 knots within the port limits, en-route to, or at the disposal ground. • Vessels must maintain a 300 m exclusion zone with all whales en-route to and from the disposal ground and within the disposal ground. • Education of all personnel. • Active management such as daily information exchange on known marine mammal activity (e.g. via local residents, commercial fishers, mussel farmers, NPWS whale watch and Cat Balou Cruises). • Awareness of the presence of marine fauna in the local waterway by vessel operators so that they can adopt appropriate speeds and clearance when cetaceans are nearby. • Variable or zoned (time and place) speed limits during the operation phase, particularly in relation to Southern right whales and humpback whale	Construction / Operation	9.3.3 & 9.3.4

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
		feeding aggregations and during peak marine mammal visitation periods within Twofold Bay.		
3.18	Aquatic Ecology	To reduce the potential for noise impacts on marine fauna (specifically marine mammals) the Piling Operation Procedures outlined in the EPBC Act Referral must be followed: Piling Operation Procedures: a) Pre-start Observation: Marine mammal observers must visually monitor observation and shut-down zones for whales for a minimum of 30 minutes before the commencement of piling. b) Soft-Start Procedure: If after the 30 minute pre-start observation no whale/s have been spotted within the observation or shutdown zone a soft start procedure may commence with a gradual increase in piling impact energy of no more than 50% of full impact energy for 10 minutes. The soft start procedure must be implemented after breaks in piling driving of 30 minutes or more. c) Stand by procedure: If a whale is spotted within the observation zone during the soft start procedure the operator of the piling equipment must be placed on standby to shut-down the piling rig and a trained crew member should continuously monitor the whale/s in sight at all times. d) Normal Piling Procedure: If no whale/s has been sighted during the soft-start procedure full impact piling may commence. Contractor(s) must make reference to EPBC Act Referral for specific details.	Construction	9.3.3
3.19	Aquatic Ecology	To reduce the potential for noise impacts on marine fauna (specifically marine mammals) the following Shut-Down requirements outlined in the EPBC Act Referral must be followed: Shut-Down requirements: a) If visibility is poor and the marine mammal observer is unable to clearly identify objects to the full observation zone distance, a vessel or aircraft search must be conducted or the action postponed until visibility has improved. b) Piling is not permitted between 6.00 pm and 7.00 am. c) If any whales are spotted within the shut-down zone, piling must cease immediately or as soon as safe to do	Construction	9.3.3

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
		so until the whale/s has moved outside of the shut-down zone. d) All piling must cease for a minimum of 1 hour after the last sighting of a whale within the observation zone. Piling must recommence at the pre-start observation after the 1 hour shutdown has elapsed. Contractor(s) must make reference to EPBC Act Referral for specific details.		
3.20	Aquatic Ecology	Methods on how to deter seals and sea lions from damaging property have been published by the National Oceanic and Atmospheric Administration (NOAA 2015). These methods include: • Barriers and exclusion devices (e.g. fencing, posts, bull rails, electric fencing, netting, swim step protectors). • Visual repellents (e.g. flags, flashing lights / strobes, balloons, human attendants). • Noise makers (e.g. horns, whistles or bells, electronic acoustic devices, clapping, banging). • Physical contact (e.g. water hoses, poles, sprinklers or sprayers). The potential impacts and possible deterrents to stop Fur Seals from utilising the end of the breakwater during construction were discussed with experts in the field of marine mammals from the Merimbula NPWS (Craig Dickman), DPI-Fisheries, Eden (Matthew Proctor), Macquarie University (Rob Harcourt) and ORRCA (Organisation for the Rescue and Research of Cetaceans in Australia). All experts advised that seals will move away from the area during construction and remain at distance from any activities occurring at the end of the breakwater whilst construction is occurring. Any attempt to deter seals using barriers, visual and noise deterrents and physical are more likely to cause impacts to the seals than the development itself. Based on this advice no removal or deterrence of fur seals from the breakwater or construction area should be undertaken as a mitigation measure.	Construction	9.3.3
3.21	Aquatic Ecology	All injured marine mammals should be immediately reported to the ORRCA 24 hour hotline on 02 9415 3333 or NPWS on 1300 361 967. The ORRCA telephone hotline is staffed by volunteers and keeps ORRCA members, Government Authorities and interested members of the public informed of marine mammal emergencies, incidents and sightings.	Construction / Operation	9.3.3 & 9.3.4

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
		ORRCA representatives will quickly mobilise to site and attempt to capture and treat the stricken animal. Depending upon the location of the animal and the circumstances that surround the injury, breakwater construction activities may need to cease or be altered to enable the rescue of the animal.		
3.22	Aquatic Ecology	There is no way to mitigate the direct impacts of dredging on benthic marine infauna within the dredge footprint as these organisms will be directly removed via dredging activities.	Construction	9.3.3
3.23	Aquatic Ecology	There is no way to mitigate the impacts on smothering of benthic infauna at the disposal site from dredge material disposal. However, given that the sediment which will be disposed of consists mainly of sand, recolonization of the disposal area following disposal is expected to occur over time.	Construction	9.3.3
3.24	Aquatic Ecology	The four goals of the NSW *Invasive Species Plan 2008 – 2015* (NSW DPI 2008) must be adopted for the Project: 1. Exclude – i.e. prevent the establishment of new invasive species. The challenge is to identify species, thoroughly assess potential invasiveness and implement effective barriers to prevent their establishment. 2. Eradicate or Contain – i.e. eliminate or prevent the spread of new invasive species. The challenge is to develop and deploy effective and efficient ways to eradicate or contain an introduced species before it becomes widespread. 3. Effectively Manage – i.e. reduce the impacts of widespread invasive species. The challenge is to manage or control of species to reduce their impact where benefits are greatest. 4. Capacity – i.e. ensure NSW has the ability and commitment to manage invasive species. The challenge is for NSW to have the knowledge, skills, resources and systems to address the impacts of invasive species.	Construction / Operation	9.3.3 & 9.3.4
3.25	Aquatic Ecology	All Contractor(s) must undertake a Vessel Risk Assessment (VRA) for each vessel prior to mobilisation of the vessel to site. The VRA may be undertaken by the vessel owner/operator. All vessels, floating plant and dredge equipment mobilised to site from any place inside or outside of Australia shall be subject to a VRA. The VRA will determine if an Invasive Marine Species inspection (IMS) is required. The Contractor(s) must provide the completed VRA to the Principal at least four	Construction	9.3.3

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
		weeks prior to the vessel leaving the departure port.		
3.26	Aquatic Ecology	The Contractor(s) must undertake an Invasive Marine Species (IMS) inspection of all vessels assessed in the VRA as uncertain or high risk for introduction of invasive marine species. Any construction vessels mobilised from outside of Australia shall be considered high risk and an IMS inspection must be carried out.	Construction	9.3.3
3.27	Aquatic Ecology	The IMS inspection must be undertaken by an appropriately qualified practitioner with experience in biosecurity of marine vessels. The Contractor(s) is responsible for arranging the IMS inspection and attendance of DPI-Fisheries.	Construction	9.3.3
3.28	Aquatic Ecology	The Contractor(s) must provide the completed IMS report to the Principal at least seven days prior to the vessel leaving the departure port.	Construction	9.3.3
3.29	Aquatic Ecology	Where IMS inspections identify significant amounts of sediment and/or the presence of an invasive marine species (as deemed by the IMS inspector) the vessel must be dry docked and cleaned prior to entering the site. The Contractor(s) must then resubmit the VRA and if the vessel is classified as low risk it shall be permitted to sail to site and begin operations.	Construction	9.3.3
3.30	Aquatic Ecology	Construction vessel antifouling must be maintained to avoid the attachment and potential translocation of invasive species into and out of Twofold Bay.	Construction	9.3.3
3.31	Aquatic Ecology	Spillage of dredged sediments during transit to the disposal location must be avoided so as not to increase the distribution of invasive species which may occur within the Snug Cove area but not yet in other areas of Twofold Bay. This should be done via proper containment of marine sediments on the barges.	Construction	9.3.3
3.32	Aquatic Ecology	Ballast water management: • Ballast water exchange by domestic vessels must be avoided. • Domestic vessels should manage ballast water in accordance with the *Australian Ballast Water Management Requirements* (Department of Agriculture and Water Resources 2016). • Any ballast water exchange from international vessels must be undertaken in accordance with the *International Convention for the Control and Management of Ships' Ballast Water and Sediments* (BWM) (IMO 2016) – i.e. "whenever possible, conduct ballast water exchange at least 200	Construction / Operation	9.3.3 & 9.3.4

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
		nautical miles from the nearest land and in water at least 200 m in depth, taking into account Guidelines developed by IMO" and "in cases where the ship is unable to conduct ballast water exchange as above, this should be as far from the nearest land as possible, and in all cases at least 50 nautical miles from the nearest land and in water at least 200 m in depth".		
3.33	Aquatic Ecology	For all commercial vessels and/or barges, dredge or other equipment coming from overseas the Australian Government Department of Agriculture and Water Resources processes for pre-arrival, arrival and inspection and post-arrival must be followed. These can be found at: http://www.agriculture.gov.au/biosecurity/avm/vessels/commercial-vessels/barges-and-towed-vessels http://www.agriculture.gov.au/biosecurity/avm/vessels/commercial-vessels/process_for_commercial_vessels	Construction	9.3.3
3.34	Aquatic Ecology	For cruise ships coming from outside of Australian waters the procedures outlined in Australia's National System for the Prevention of Marine Pest Incursions shall be adopted. Cruise ships must also adopt the Australian Government Department of Agriculture and Water Resources processes of reporting and pre-arrival which can be found at: http://www.agriculture.gov.au/biosecurity/avm/vessels/commercial-vessels/cruise-vessels	Operation	9.3.4
3.35	Aquatic Ecology	Monitoring and inspection / surveillance of the dredge vessel and barges must be undertaken in accordance with the *Biosecurity Act 2015*.	Construction	9.3.3
3.36	Aquatic Ecology	Monitoring of potential pest species establishment at the disposal ground post disposal must be undertaken.	Post-Construction	9.3.3
3.37	Aquatic Ecology	Temporary relocation of the nearby mussel aquaculture facility from their current Cattle Bay lease area to lease AL06/001 at Boydtown for the duration of construction will help to ensure that construction related impacts on mussel aquaculture are avoided.	Construction	9.3.3
3.38	Aquatic Ecology	To reduce the potential impacts of water quality on the mussel aquaculture lease area located near the study area during operation all mitigation measures outlined in Section 9.1 (Water Quality) of the EIS must be adopted.	Operation	9.3.4

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
3.39	Aquatic Ecology	DPI-Fisheries (1800 043 536) must be immediately notified of any fish kills *within the site* ~~in the vicinity of the construction works~~. In such cases, all works other than emergency response procedures are to cease until the issue is rectified and written approval to proceed is provided by DPI-Fisheries.	Construction / Operation	9.3.3 & 9.3.4
*3.40 **	*Aquatic Ecology*	*The Department to make contact with the NSW Food Authority prior to dredging to determine if they have detected any HAB species in the area in order to inform any risk assessment and subsequent management.*	*Pre-Construction*	*9.3.2*
4.01	Terrestrial Ecology	Potential impacts of lighting on birds can be reduced by limiting the need for construction activities to be undertaken during the evening and night time – this will reduce the overall need for construction related artificial lighting (on vessels and on the land portion of the site) and associated impacts.	Construction	9.4.2
4.02	Terrestrial Ecology	Below water construction noise (from activities such as piling or dredging) is expected to have little impact on shorebirds and marine birds that will generally be above water. Nevertheless, the mitigation measures proposed to reduce underwater noise impacts in the Aquatic Ecology section of this EIS will also negate any potential for underwater noise impacts to occur on birds if they happen to be feeding / diving underwater at the time of these works (refer to Section 9.3 Aquatic Ecology).	Construction	9.4.2
4.03	Terrestrial Ecology	Above water construction noise impacts, which have the potential to impact on the behaviour of shorebirds and marine birds, are to be managed in accordance with the Construction Noise Management Measures outlined in Section 6.6 of PEL (2016) and the Noise and Vibration Mitigation Measures outlined in Section 9.6.4 of this document. These measures generally aim to reduce the severity and/or duration of noise emissions from construction plant and activities.	Construction	9.4.2
4.04	Terrestrial Ecology	To reduce the potential impacts of marine debris on shorebirds and marine birds, waste associated with the construction and operation of the Project are to be managed as per Section 9.16.4 of this document (Waste Management Mitigation Measures).	Construction and Operation	9.4.2 & 9.4.3
4.05	Terrestrial Ecology	To reduce the potential impacts of water quality / water pollution on shorebirds and marine birds, water quality impacts are to be mitigated as per Section 9.1.6 (Water Quality Mitigation Measures). There are numerous ways to mitigate water quality impacts and with adoption of these no significant impacts on birds are expected.	Construction and Operation	9.4.2 & 9.4.3

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
4.06	Terrestrial Ecology	Mitigation measures to reduce the potential for vessel strike have been discussed in the Section 9.3.4 (Aquatic Ecology Mitigation Measures). While it is highly unlikely that birds will be impacted by vessel strike to begin with, the adoption of these measures will also reduce the potential risks of vessel strike on birds.	Construction and Operation	9.4.2 & 9.4.3
4.07	Terrestrial Ecology	Potential impacts of lighting on birds can be reduced through installation of downward directed lighting – this may be adopted for any lighting along the wharf structures. Downward directed lighting will reduce light emissions into the sky and therefore potential impacts such as disorientation of and/or attraction of migratory birds passing by at night.	Operation	9.4.3
4.08	Terrestrial Ecology	Potential impacts of lighting on birds can be reduced by the use of green or blue lighting (rather than white or red) where possible, noting sector light is red) these colours have been proven to have little or no effect on the behaviour / orientation / attraction of avian species whereas white or red lighting are known to have much more of an impact.	Operation	9.4.3
4.09	Terrestrial Ecology	Many noise impacts associated with the operation of the Project will be similar to impacts already present at the site, and other will be unavoidable, however, some ship noise related impacts are likely to be improved over time with technological advances in industrial standards. In the meantime, operational related impacts will only be short term and occasional and are unlikely to significantly affect birds in the study area.	Operation	9.4.3
4.10	Terrestrial Ecology	All ships at sea must adhere with the amendments to the International Maritime Organisation's (IMO's) International Convention for the Prevention of Pollution from Ships (MARPOL) Annex V which came into force on 1 January 2013. The amendments prohibit the discharge of all garbage from ships into the sea (except under very specific circumstances). This reverses the presumption that garbage may be discharged into the sea based on defined distances from shore and the nature of the garbage. The amendments also list requirements for garbage management plans on ships and port reception facilities for receiving waste. MARPOL is implemented in Australia through the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*.	Operation	9.4.3
4.11	Terrestrial Ecology	Human interference with birds, such as inappropriate feeding, can largely be managed through the education	Operation	9.4.3

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
		of passengers about the potential risks to shorebirds and marine birds from such practices. Educational measures could include signage on the wharf and/or information provided to passengers on board vessels regarding local native wildlife and threats to wildlife on entry to the Port.		
5.01	Traffic, Transport and Access	The final location of the navigation aid is to ensure that the existing footpath on the Snug Cove foreshore remains unimpeded to allow access to/from the wharf.	Detailed Design	9.5.2
5.02	Traffic, Transport and Access	Relocation of impacted swing moorings is to be assessed and undertaken by RMS by 30 June 2017.	Pre-Construction	9.5.2
5.03	Traffic, Transport and Access	Preparation and implementation of CEMP to manage the impacts of construction works.	Pre-Construction / Construction	9.5.2
5.04	Traffic, Transport and Access	Implementation and adherence to the defined "Marine Construction Zone" and "Construction Vessel Mooring Zone" to ensure protection of construction vessels and existing and future port users.	Construction	9.5.2
5.05	Traffic, Transport and Access	Consultation with PANSW during construction and operation to ensure maintenance of safe navigation for shipping.	Construction and Operation	9.5.2 & 9.5.3
5.06	Traffic, Transport and Access	Implement the recommendations of the Smartship Australia report.	Operation	9.5.3
5.07	Traffic, Transport and Access	Preparation of an OEMP prior to operation commencement to manage the use of land and waterway areas from cruise ship operations.	Operation	9.5.3
5.08	Traffic, Transport and Access	Preparation of an Operational TMP prior to operation commencement which should address but be not limited to the following: • Bus layover area if required. • Proposed new location for the Marquee. • Temporary signage locations and speed limits. • Bus and taxi loading procedures for passengers, including disabled access. • Bus route to locations and drop-off / pick-up method. • Detailed number of shuttle bus required. • Travel access guide. • Any proposed additional bus drop-off locations.	Operation	9.5.3
6.01	Noise and	Where possible, plant and equipment is to be selected	Construction	9.6.2

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
	Vibration	that can be fitted with options to minimise noise such as covers, mufflers, shrouds and other noise suppression equipment.		
6.02	Noise and Vibration	Plant and equipment is to be turned off and not left idling when not in use. Anchorages and moorings should be used for boats or other water craft if necessary.	Construction	9.6.2
6.03	Noise and Vibration	Plant and equipment is to operate in accordance with industry standards and have been serviced as per manufacturer specifications.	Construction	9.6.2
6.04	Noise and Vibration	Noisy plant and equipment is to be oriented away from sensitive receivers where possible.	Construction	9.6.2
6.05	Noise and Vibration	Temporary screens or other items that provide a noise buffer (including plant and equipment) are to be used proximate to noise sources.	Construction	9.6.2
6.06	Noise and Vibration	Low noise emission plant and equipment is to be selected where available.	Construction	9.6.2
6.07	Noise and Vibration	Broadband reversing alarms or similar is to be used as an alternative to a traditional beeper reversing alarm for vehicles permanently on site.	Construction	9.6.2
6.08	Noise and Vibration	Plant and equipment is to be well maintained and serviced regularly to ensure it is not generating excessive noise.	Construction	9.6.2
6.09	Noise and Vibration	Tools are not to be dropped from a height onto hard surfaces.	Construction	9.6.2
6.10	Noise and Vibration	Above water noise levels are to be monitored continuously.	Construction	9.6.2
6.11	Noise and Vibration	Consider respite periods for activities that continue for extended periods of time, particularly those works to be undertaken outside normal working hours such as dredging.	Construction	9.6.2
6.12	Noise and Vibration	The use of horns and alarms are to be minimised, most particularly during works undertaken in the evening and night time periods.	Construction	9.6.2
6.13	Noise and Vibration	The staff and visitor induction protocols are to include awareness of noise generating activities and mitigation measures and techniques that should be implemented.	Construction	9.6.2
6.14	Noise and Vibration	The community is to be notified prior to noise intensive activities commencing, such as piling.	Construction	9.6.2
6.15	Noise and Vibration	The community is to be informed prior to any out of hours work commencing.	Construction	9.6.2

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
6.16	Noise and Vibration	A complaints procedure is to be implemented by the Contractor and contact details provided to potentially affected residents and businesses in the area.	Construction	9.6.2
6.17	Noise and Vibration	The Contractor's complaints procedure is to include a record of complaints indicating cause and measures taken to resolve/minimise cause.	Construction	9.6.2
6.18	Noise and Vibration	Where noise levels are above the highly noise affected levels the contractor is to consult with the community to identify work practices or alternative mitigation measures that aim to minimise the intrusiveness of the noise generating activities as much as possible. These may include letterbox drops, attended noise monitoring, individual briefings, project specific respite and phone calls to affected stakeholders.	Construction	9.6.2
6.19	Noise and Vibration	Works are to be scheduled to minimise the number of noisy plant and equipment operating at any one time.	Construction	9.6.2
6.20	Noise and Vibration	Construction activities are to be planned to minimise vehicular movements around the site.	Construction	9.6.2
6.21	Noise and Vibration	High vibration methods are to be substituted with lower vibration methods where possible.	Construction	9.6.2
6.22	Noise and Vibration	Trial measurements are to be conducted at the furthest point from sensitive receivers to test predicted values and ensure vibration compliance is achieved.	Construction	9.6.2
6.23	Noise and Vibration	Alternatives to high vibration plant and equipment are to be used where possible.	Construction	9.6.2
7.01	Air Quality	Mitigation measures for air quality have been included in the CEMP. The mitigation measures would be developed to satisfy an air quality performance objective to minimise polluting air emissions produced during construction works. Air quality management actions during construction would be the responsibility of the construction contractor and would be implemented throughout the duration of the construction period.	Construction	9.7.2
7.02	Air Quality	All plant and equipment used during the construction works would be regularly maintained to comply with the relevant exhaust guidelines. Prior to the commencement of work all construction equipment would be inspected by a qualified person to ensure emissions are minimised.	Construction	9.7.2
7.03	Air Quality	Any visible dark emissions from vessel exhausts would be reported and the equipment repaired or replaced as soon as practicable.	Construction	9.7.2

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
7.04 *	Air Quality	Refuelling activities would *generally* be undertaken during daylight hours and undertaken by trained personnel only.	Construction	9.7.2
7.05	Air Quality	To minimise potential air quality impacts during the operational phase it is recommended that cruise ships entering the port adopt low sulphur fuels.	Operation	9.7.3
8.01	Property and Land Use	Relocation of impacted swing moorings is to be assessed and undertaken by RMS by 30 June 2017.	Pre-Construction	9.8.2
8.02	Property and Land Use	Eden Sea Farms is to be temporarily relocated prior to dredging.	Pre-Construction	9.8.2
8.03	Property and Land Use	Preparation and implementation of CEMP to manage the impacts of construction works.	Pre-Construction / Construction	9.8.2
8.04	Property and Land Use	Implementation and adherence to the defined "Marine Construction Zone" and "Construction Vessel Mooring Zone" to ensure protection of construction vessels and existing and future port users.	Construction	9.8.2
8.05	Property and Land Use	Preparation of OEMP and Operational TMP to manage the use of land and waterway areas from cruise ship operations.	Operation	9.8.3
9.01	Visual Amenity	The final location of the navigation aid is to ensure that the existing footpath on the Snug Cove foreshore remains unimpeded to allow access to/from the wharf.	Detailed Design	9.9.2
9.02	Visual Amenity	Preparation and implementation of CEMP to manage the impacts of construction works.	Pre-Construction / Construction	9.9.2
9.03	Visual Amenity	Implementation and adherence to the defined "Marine Construction Zone" and "Construction Vessel Mooring Zone" to ensure protection of construction vessels and existing and future port users.	Construction	9.9.2
9.04	Visual Amenity	Preparation of OEMP and Operational TMP to manage the use of land and waterway areas from cruise ship operations.	Operation	9.9.3
10.01	Health and Safety	To manage potential impact of decrease in water quality: • Water Quality Monitoring Program • CEMP and Contractor(s) EMP	Construction	9.10.2
10.02	Health and Safety	To manage potential impact of algal blooms: • CEMP and Contractor(s) EMP • Water Quality Monitoring Program	Construction	9.10.2

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
10.03	Health and Safety	To manage potential impact of increase noise: • CEMP • Contractor(s) EMP including CNVMP	Construction	9.10.2
10.04	Health and Safety	To manage potential impact of increased air emissions: • CEMP • Contractor(s) EMP • OEMP	Construction and Operation	9.10.2
10.05	Health and Safety	To manage potential impact of odour and unsanitary conditions: • CEMP • Contractor(s) EMP including Construction Waste Management Plan • OEMP	Construction and Operation	9.10.2 & 9.10.3
10.06	Health and Safety	To manage potential impact of decreased visual amenity, the large cruise ships at berth will be transient in nature with no overnight berthing.	Operation	9.10.3
10.07	Health and Safety	To manage potential impact of pests: • OEMP (Waste Management Plan)	Operation	9.10.3
10.08	Health and Safety	To manage potential impact of safety: • Maritime Safety procedures • Occupational Health and Safety procedures	Construction and Operation	9.10.2 & 9.10.3
10.09	Health and Safety	To manage potential food safety risks: • NSW Food Safety Program • Testing is required on the mussels to be undertaken by Eden Sea Farms ensure they meet the food safety standards and are fit for consumption	Construction and Operation	9.10.2 & 9.10.3
10.10	Health and Safety	To manage potential impacts of traffic generation: • Operational TMP	Operation	9.10.3
10.11	Health and Safety	To manage the potential impact of communicable disease: • Follow relevant NSW Public Health Unit Control Guideline for the particular infectious disease	Construction and Operation	9.10.2 & 9.10.3
11.01	Socio-Economic	Relocation of impacted swing moorings is to be assessed and undertaken by RMS by 30 June 2017.	Pre-Construction	9.11.2
11.02	Socio-Economic	Eden Sea Farms is to be temporarily relocated prior to dredging.	Pre-Construction	9.11.2
11.03	Socio-Economic	Preparation and implementation of CEMP to manage the impacts of construction works.	Pre-Construction /	9.11.2

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
			Construction	
11.04	Socio-Economic	Implementation and adherence to the defined "Marine Construction Zone" and "Construction Vessel Mooring Zone" to ensure protection of construction vessels and existing and future port users.	Construction	9.11.2
11.05	Socio-Economic	Consultation with PANSW during construction and operation to ensure maintenance of safe navigation for shipping.	Construction and Operation	9.11.2 & 9.11.3
11.06	Socio-Economic	Maximise opportunities for local and Aboriginal workforce participation during construction and operation.	Construction and Operation	9.11.2 & 9.11.3
11.07	Socio-Economic	Preparation of OEMP and Operational TMP to manage the use of land and waterway areas from cruise ship operations.	Operation	9.11.3
11.08	Socio-Economic	Implementation of the Benefit Realisation Strategy in consultation with relevant stakeholders.	Operation	9.11.3
11.09 **	*Socio-Economic*	*Implementation of a communication protocol that alerts surrounding residents in the event of a required part night or overnight berth.*	*Operation*	*9.11.3*
12.01	Coastal Processes	A water quality monitoring program will be implemented before and during dredging to manage any potential water quality impacts surrounding the dredge footprint and within the vicinity of the mussel leases and other sensitive environmental receptors (i.e., seagrass meadows). This program will be documented within the CEMP).	Construction	9.12.2
13.01	Hydrology	The CEMP is to include appropriate sediment and erosion management controls to minimise water quality impacts from surface runoff in accordance with Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004). All erosion and sediment controls to be in place prior to the commencement of any landside works, maintained throughout construction, and removed only once all disturbed areas have been reinstated.	Construction	9.13.2
13.02	Hydrology	Weather and tide forecasts will be checked regularly during construction. Where flooding is forecast to the work area, all equipment and materials would be removed from the landside construction zone or appropriately secured above expected flood levels in the area.	Construction	9.13.2
13.03	Hydrology	Any car park alterations completed as part of the upgrade are to incorporate Water Sensitive Urban	Detailed Design / Construction	9.13.2

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
		Design elements such as tree pits and bioretention swales. This would provide water quality improvements to the site by slowing runoff. The approach aligns with initiative C.19 "Incorporate Water Sensitive Design (WSUD)" from the *NSW Sustainable Design Guidelines Version 3.0* (TfNSW, 2013).		
14.01	Aboriginal Heritage	Maximise opportunities for local and Aboriginal workforce participation during construction.	Construction	9.14.2
14.02	Aboriginal Heritage	Project staff and Contractor(s) would be made aware of their statutory obligations for heritage under the National Parks and Wildlife Act 1974 through the site induction and toolbox talks. The Contractor(s) are to include an Aboriginal Culture Awareness module in its induction training in which the local Aboriginal community will be invited to present.	Construction	9.14.2
14.03	Aboriginal Heritage	In the event that any Aboriginal sites are disturbed and identified within the area of works, works within the immediate vicinity of the Aboriginal object will cease forthwith and the Office of Environment and Heritage (OEH) contacted so that appropriate management strategies can be identified and followed.	Construction	9.14.2
14.04	Aboriginal Heritage	In the event that skeletal remains are uncovered, works in the immediate area will cease, the area would be cordoned off and the NSW Police Coroner and Transport for NSW (TfNSW) environment team would be contacted to determine if the material is of Aboriginal origin. If determined to be Aboriginal, the OEH Enviroline 131 555 and relevant Aboriginal stakeholders would be contacted to determine an action plan for the management of the skeletal remains prior to works re-commencing.	Construction	9.14.2
15.01	Historic Heritage	All relevant staff and contractors are to be trained regarding their statutory obligations and responsibilities under the *Heritage Act 1977* and best practice outlined in *The Burra Charter 2013*, through the site induction and toolbox talks in the event suspected historical cultural material is uncovered.	Construction	9.15.2
15.02	Historic Heritage	In the event that any potential archaeological 'relics' or 'historic shipwrecks' are disturbed and identified within the site during construction works, all work in the area shall cease forthwith and the Heritage Division and a qualified archaeologist be consulted to determine an appropriate course of action prior to the recommencement of work in the area of the 'relic' or 'historic shipwrecks'. This protocol to be included the	Construction	9.15.2

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
		CEMP.		
16.01 *	Soils and Geotechnical	A list of geotechnical design parameters based on the results of the boreholes and laboratory testing has been developed and presented in Table C1 in Appendix C of the Geotechnical Investigation Interpretive Report (Appendix L). The parameters have been considered during design development to ensure geotechnical hazards during construction are reduced as much as possible. *This includes:* 1. ~~This includes~~ *A* reduced extent for the dredging footprint in the vicinity of the Multipurpose Jetty to ensure it is not compromised during the dredging activities. 2. *A new berthing line offset approximately 11m from the face of the existing Breakwater Wharf to achieve the required factors of safety and to minimise the impact that the ~~of~~ dredging would have on the existing structure.* 3. *Scour prevention mattress to protect the existing Breakwater Wharf from undermining due to the actions of ships propellers following construction.*	Detailed Design	9.16.2
16.02	Soils and Geotechnical	The naturally occurring asbestos material in the rock on the breakwall is to be safely relocated to areas along the existing breakwater that require repair/strengthening. The subsurface water mains pipes and electrical box in the carpark that are presumed to contain asbestos should be left insitu, labelled with warning signage, and maintained in their current condition. Asbestos is to be removed prior to any demolition or other intrusive work that may disturb the asbestos. The PCB containing capacitors on the wharf are to be left insitu and removed prior to demolition. The subsurface fill material was not sampled during the hazardous substances survey but further investigation is recommended prior to intrusive ground works. The soil will need to be classified in accordance with the *Waste Classification Guidelines* (NSW EPA, 2014) prior to offsite disposal.	Construction	9.16.2
17.04	Soils and Geotechnical	All friable and non-friable asbestos-containing waste on-site shall be handled and disposed off-site at an EPA licensed waste facility by an EPA licensed contractor in accordance with the requirements of the *Waste Classification Guidelines* (NSW EPA, 2014) and any other regulatory instrument as amended.	Construction	9.16.2

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
17.01	Utilities and Services	Investigations will be carried out by the Contractor(s) to ensure that all appropriate measures are in place to minimise the potential risks to existing utilities and services prior to commencement of construction works.	Detailed Design and Construction	9.17.2
17.02	Utilities and Services	Relevant service utility providers or owners will be consulted to verify the location of all services and to determine any potential impacts of the works. This includes requirements for protection, relocation or decommissioning of services.	Construction	9.17.2
17.03	Utilities and Services	The Contractor(s) will be required to verify the location of all existing utilities in the vicinity of the project area and protect the utilities as necessary. This will include a Dial Before You Dig (DBYD) enquiry and survey of underground utilities as required.	Construction	9.17.2
17.04	Utilities and Services	Any utility upgrades, such as the installation of additional fire hydrants and fire-fighting equipment, potable water supply upgrades or upgrades to power supply to the wharf, will be conducted such that service impacts on utility customers are minimised. This may involve completing works at night or at specific times.	Construction	9.17.2
18.01	Waste Management	The Contractor(s) is to prepare and implement Construction Waste Management Plan (CWMP). The CWMP specifies the management of each waste stream (non-liquid, liquid, and gaseous).	Construction	9.18.2
18.02	Waste Management	During the construction phase the following mitigation measures would be implemented: • All waste would be classified in accordance with the Waste Classification Guidelines (NSW EPA, 2014). • Construction materials would be procured to ensure minimal cut-off and wastage. • Excess construction material suitable for reuse would be returned to the supplier, or recycled. • Waste streams would be kept separate on site to reduce cross-contamination and ensure the wastes are handled appropriately. • Barges for dredged material would not be overloaded to prevent spillage of dredged material while being transported to the offshore disposal site. • Vehicles used for the transportation of waste would be covered to prevent loss of waste. • Waste to be disposed offsite would be disposed to a waste facility that is licenced to receive that type	Construction	9.18.2

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
		of waste stream. • Waste to be transported offsite would be recorded including type, quantity and destination. • Hazardous waste such as waste oil and lubricating oil would be recycled at an appropriately licenced recycling waste depot. • Portable toilets would be emptied on a regular basis and human waste disposed of to a local sewage treatment plant. • Recycling facilities (garbage bins or other suitable receptacles) would be provided to maximise recycling of waste materials such as plastic, glass, aluminium cans, and paper/cardboard.		
18.02	Waste Management	Once the wharf extension is complete ongoing waste management for the wharf would be the responsibility of the Department. The following measures are suggested initiatives that should be included in an Operational Waste Management Plan for the port. • Waste receptacles on the wharf should be designed to deter birds and vermin, and should be routinely checked (at least quarterly) to ensure they are fit for purpose, appropriately sized, and securely contain waste. • Recycling facilities should be provided on the wharf to maximise recycling of waste materials such as plastic, glass, aluminium cans and paper. • Maintenance materials, including waste oil and lubricants, would be disposed at an appropriately licenced facility.	Operation	9.18.3
19.01	Greenhouse Gas and Energy	The layout design has been optimised to allow use of the existing wharf and breakwater, using the embodied energy from the historic capital construction of these thus removing the additional greenhouse gas emissions which would have been caused by demolishing and reconstructing these items The design has included offsetting and angling the berth to reduce the impact on the existing structure and the breakwater. The stern of the larger ships would be unprotected by the breakwater which removes the requirement for additional construction and associated construction materials for the breakwater. The dredging design of the berth pocket has been optimised, including the use of ship simulation, to reduce dredging towards the east and west where ships will not travel. This reduces the volume of dredging,	Detailed Design	9.19.2

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
		disposal and associated greenhouse gas emissions. Geotechnical and geophysical investigations have been undertaken to remove the requirement for drilling and blasting of rock material. Investigations showed material could be removed by backhoe, which would have been on site to remove blasted material anyway. The structural design has been optimised to reduce the amount of steel and concrete used. Steel would be used for the dolphins to allow offsite fabrication and minimise requirement for barges, workboats and associated equipment on site, which would otherwise have produced more greenhouse gas if structures were fully constructed over water. Concrete would be used for the main deck, which should be locally sourced sand and aggregate, reducing transport associated greenhouse emissions. Use of concrete in these areas is a more durable solution than steel or timber, and an underside coating specified to further improve durability. The specification of coating and cathodic protection (CP) system to increase durability of steel structures will reduce the requirement for painting steel below water, and associated in water maintenance of coating system.		
19.02	Greenhouse Gas and Energy	Sustainable procurement practices would be adopted where feasible. This would include selecting recycled construction materials (including recycled concrete, steel and timber) where available and giving preference to recycled over virgin materials. In addition the following measures would be considered: • Construction materials would be sourced locally where possible. • Construction materials that have minimal embodied energy should be selected. • Use of PVC plastic would be minimised. • Construction materials that are low maintenance and durable should be considered. • Plant and equipment would be switched off when not in constant use and not left idling. • Plant and equipment brought onsite would be regularly serviced and energy efficient vehicles or equipment would be selected where available. • Any plant and equipment that is not working efficiently (i.e. emitting excessive smoke) would be removed from site and replaced as soon as possible.	Construction	9.19.2

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
		• Demolition, construction, and dredging works would be planned to ensure minimal movement of plant and equipment, including barges. • At least 10% of site based electricity needed during construction should be sourced from renewable or green sources.		
19.03	Greenhouse Gas and Energy	• The potential to generate energy on-site (such as the use of photo-voltaic lighting) should be considered. • The operators of cruise ships entering the port should consider using low sulphur fuel.	Operation	9.19.3
20.01	Hazards and Risks	Application of safety in design principles to ensure safe access to all new facilities.	Detailed Design	9.20.2
20.02	Hazards and Risks	Preparation and implementation of a CEMP to manage the potential environmental and constructions hazards impacts. This is to include the relevant mitigation measures identified throughout the EIS.	Construction	9.20.2
20.03	Hazards and Risks	Preparation and implementation of Construction Noise and Vibration Management Plan to manage the impacts to sensitive receives (refer to Section 9.6).	Construction	9.20.2
20.04	Hazards and Risks	Preparation and implementation of a Construction Waste Management Plan that specifies the management of each waste stream (non-liquid, liquid, and gaseous) would be prepared by the contractor and incorporated into the CEMP for the Project (refer to Section.	Construction	9.20.2
20.05	Hazards and Risks	Site safety protocols, tool box talks, risk assessments, Safe Work Method Statements, and incident management and emergency procedures would be prepared prior to the commencement of construction works and implemented as required throughout construction.	Construction	9.20.2
20.06	Hazards and Risks	Implementation and adherence to the defined "Marine Construction Zone" and "Construction Vessel Mooring Zone" to ensure protection of construction vessels and existing and future port users.	Construction	9.20.2
20.07	Hazards and Risks	Preparation and implementation of OEMP and Operational TMP to manage the use of land and waterway areas from cruise ship operations.	Operation	9.20.3
20.08	Hazards and Risks	Implementation of existing PANSW management policies and procedures including navigation and passage plans, security management and the Emergency Response Plan for port-related emergencies	Construction and Operation	9.20.2 & 9.20.3

Ref	Issue	Mitigation Measure	Phase	Relevant EIS Section
		such as oil and chemical spills.		
20.09	Hazards and Risks	Preparation of an Operational Waste Management Plan to manage ongoing waste with provision for updating on stated periodic basis.	Operation	9.20.3
20.10	Hazards and Risks	Provision and maintenance of fire-fight equipment and hydrants.	Operation	9.20.3
21.01	Cumulative Impacts	Preparation and implementation of CEMP to manage the impacts of construction works.	Pre-Construction / Construction	9.21.2
21.02	Cumulative Impacts	Implementation and adherence to the defined "Marine Construction Zone" and "Construction Vessel Mooring Zone" to ensure protection of construction vessels, aquatic habitats, marine fauna and existing and future port users.	Construction	9.21.2
21.03	Cumulative Impacts	Preparation of OEMP and Operational TMP to manage the use of land and waterway areas from cruise ship operations.	Operation	9.22.2

7 Conclusion

The RTS has been prepared under Section 115Z(6)(a) of the EP&A Act to support SSIA 16_7734. The document responds to the matters raised by DP&E and in submissions by agencies, stakeholders and the public during the public exhibition period. It is submitted that the conclusions made in Section 11 of the EIS remain valid.

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Appendix A: NSW ALC Consultation

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Appendix B: Sediment Plume Impact Study

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Appendix C: Baseline Water Quality Data Collection Report

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Appendix D: Wave Modelling

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Appendix E: Harmful Algal Bloom and Dredging Interaction Assessment

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Appendix F: Heavy Vehicle Traffic Assessment