Kingston Pier Channel Construction

Stakeholder Consultation Pack
Initial Design (30 per cent Design)

May 2020
About this Stakeholder Consultation Pack

The Norfolk Island community is invited to provide feedback on this initial design (30 per cent design) of the proposed Kingston Pier Channel construction project.

The project will increase the channel bed’s depth and width to improve access and safety and ensure it meets required standards.

It will also support greater usage of the pier by commercial charter and fishing vessels and emergency responders.

Improved safety in all tides and all workable weather conditions will be achieved, which will provide considerable benefits to pier users and the broader community.

At the beginning of the year, the Department of Infrastructure, Transport, Regional Development and Communications (the department) engaged Advisian Pty Ltd as the design services contractor (DSC) for the project.

In line with the Norfolk Island Community Engagement Framework, Advisian and its sub-contractor, Consult Marine Pty Ltd, met with community members and stakeholders in mid-February 2020.

The purpose of the discussions was to gain an understanding of their views on the project to inform this initial design (30 per cent design).

The Department welcomes feedback from the community on this initial design (30 per cent design) to ensure it is in line with community expectation and meets operational requirements.

This community feedback will inform the next stage of the design (80 per cent design) which will be made available to the community for further feedback.

It is important to note that the final design will require approval under the Environmental Protection and Biodiversity Conservation (EPBC) Act prior to construction. Progression to the construction stage would be subject to community and Government priorities and the outcome of future budget processes.
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Project background and context

Kingston Pier Channel

- Kingston Pier is historically, culturally and economically important to Norfolk Island and its community.
- It is critical infrastructure for both freight and cruise ship passengers.
- An existing channel of about 8 metres width was dredged in the 1980s.

Project overview

- The Project would involve augmenting the existing channel bed, widening and deepening to improve vessel access and safety.
- The augmented channel will support greater use of Kingston Pier by all vessel users.
Project background and context

Project objectives

The main objectives for the Project are to:
1. Provide a deeper and wider approach channel for commercial and recreational vessels.
2. Increase the availability of Kingston Pier for berthing of vessels by providing a safer berthing approach.
3. Communicate and engage effectively and in a timely manner with Norfolk Island stakeholders and community, and involve them in key decisions made.
4. Consider and minimise environmental, social and economic impacts.
5. Ensure the project is sympathetic to and complies with the KAVHA Heritage Management Plan (2016).
6. Cause minimal impact to existing port operations and structures during construction.
7. Use local labour and resources where possible and appropriate.
8. Consider future allowance for larger vessels to enter the channel.
9. Deliver the project by the end of 2021, and within the project budget.
Project background and context

- Undermining of Kingston Pier
- Managing sediment plumes
- Wave climate at berth
- Maritime artefacts covered in seabed
- Heritage significance of Kingston
- Accommodating existing port users
- Onshore disposal of dredge spoil
- Remoteness of the site
- Challenging sea-state conditions
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- Managing sediment plumes
- Wave climate at berth
- Maritime artefacts covered in seabed
- Heritage significance of Kingston
- Accommodating existing port users
- Onshore disposal of dredge spoil
- Remoteness of the site
- Challenging sea-state conditions

Risks and Challenges
Project background and context

Stakeholder consultation

A stakeholder consultation trip took place between 17 February 2020 to 21 February 2020 and the Project Team engaged with the impacted groups and interested parties. A summary of the key issues are given below:

• Stakeholders agreed the Kingston Pier should remain available for boat launching, cargo and cruise ship passengers at times during the construction stage.

• Stakeholders agreed the project should minimise environmental impact.

• Some stakeholders suggested the navigation channel design should allow for future larger vessels however other stakeholders suggested not designing for this case.

• Stakeholders were concerned the channel works would cause changes to the behaviour of waves entering the harbour (i.e. larger unbroken waves). It was suggested that a wave modelling analysis be undertaken to better understand the impact of channel works on wave behaviour.
Stakeholder consultation (con’t)

- Some stakeholder would prefer the bombora located about 60m west of the pier be removed and others held the opinion that it should remain in place as it helps reduce the wave climate at the pier.

- Stakeholders were divided on whether navigation aids should be provided. Some held opinions that no markers were required, others held opinions that at least one should be provided on the edge of the rock shelf at the head of the pier.

- The effects on the end of the ramp by the channel works would need to be considered.

- A swing area would be required adjacent to the berth (i.e. a turning radius for vessels), in addition to the channel widening.

- The project should consider the beneficial reuse of the excavated spoil as appropriate.
Kingston Pier Channel Options

Design Vessels

The design channel considers two design vessel fleets:

- Current vessel fleet – draft/beam governed by the Passenger Transfer Vessels and Lighters but considers all commercial and recreational vessels.
- Future vessel fleet – possible cargo transfer vessels and larger fishing vessels.

<table>
<thead>
<tr>
<th>Vessel type</th>
<th>Vessel Length</th>
<th>Vessel Beam</th>
<th>Vessel Draught</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current design vessel</td>
<td>12m</td>
<td>5.3m</td>
<td>1m</td>
</tr>
<tr>
<td>Proposed future design vessel</td>
<td>18m</td>
<td>6.5m</td>
<td>1.5m</td>
</tr>
</tbody>
</table>
Four options were considered for the design channel dimensions. These options aim to satisfy the key objectives presented in Slide 4.

<table>
<thead>
<tr>
<th>Option</th>
<th>Design Vessel</th>
<th>Entrance channel width</th>
<th>Interior channel width</th>
<th>Channel depth</th>
<th>Material Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 1</td>
<td>Current vessel fleet</td>
<td>20m</td>
<td>18m</td>
<td>-2.7m MSL</td>
<td>2,500m³</td>
</tr>
<tr>
<td>Option 2</td>
<td>Current vessel fleet</td>
<td>26.5m</td>
<td>24m</td>
<td>-2.7m MSL</td>
<td>4,000m³</td>
</tr>
<tr>
<td>Option 3</td>
<td>Future vessel fleet</td>
<td>20m</td>
<td>27m</td>
<td>-3.2m MSL</td>
<td>5,400m³</td>
</tr>
<tr>
<td>Option 4</td>
<td>Future vessel fleet</td>
<td>32.5m</td>
<td>36m</td>
<td>-3.2m MSL</td>
<td>8,200m³</td>
</tr>
</tbody>
</table>
Design Channel Option 1

Entrance channel

Interior channel
Design Channel Option 2
Design Channel Option 3
Design Channel Option 4
Kingston Pier Channel Options

Navigation Aids

Navigation aids, in the form of channel markers, for the Kingston Pier Channel were considered to be beneficial by some stakeholders for the safe navigation of vessels. Three locations have been considered for navigation aids.

- Location A – a permanent piled marker located on the edge of the rock shelf.
- Location B – a temporary buoy located on the edge of the channel, used on an as-needed basis (e.g. for PTV arrivals).
- Location C – a hazard/channel marker (buoy or pile) at the bombora to the west of the channel. It is noted there are stakeholder WHS concerns with a marker in this position interfering with towed vessels.

If navigation aids are agreed, they would be fitted with a light which could be turned on at scheduled times.
Impacts on wave climate

Wave model

Advisian performed wave modelling to understand the impact on wave climate at the Kingston Pier Channel. The scenario modelled is for high tide and median wave heights. Median wave heights are exceeded 50% of the time and thus considered appropriate to assess for navigation impacts. The 1 in 1 Year Average Reoccurrence Interval event was also modelled but not displayed.

Wave modelling results indicate that the width of the channel has more influence on the wave energy entering the harbour, than the channel depth.

Options 1 and 3 that have the narrower channel widths, generally resulted in a decrease in the amount of wave energy approaching Kingston Pier while Options 2 and 4 resulted in an increase in wave energy approaching the pier.
Impacts on wave climate

Wave model – Option 1 (narrower and shallower option)

Changes in wave climate for Option 1 tends to focus larger waves towards Skate Harbour and generally away from the channel and pier. In summary:

- wave heights remains unchanged at the entrance (Points A and B).
- increases by 0.4m just inside the NW channel extent (Point C).
- increases and decreases of 0.1m along the berth and ramp (Points D, E and F).
- increases by 0.03m at the rock revetment (Point G).

Blue indicates a decrease in wave height with yellow/red being an increase.
Impacts on wave climate

Wave model – Option 2 (wider and shallower option)

Changes in wave climate for Option 2 tends to focus larger waves towards Skate Harbour and the pier. In summary:

- wave heights remain unchanged at the entrance (Points A and B).
- increases by 0.4m just inside the NW channel extent (Point C).
- increases 0.1m along the SW berth (Points D) and 0.24m at the NW berth (Points E).
- 0.1m decrease at the ramp (Point F).
- decreases by 0.01m at the rock revetment (Point G).

Blue indicates a decrease in wave height with yellow/red being an increase.
Impacts on wave climate

Wave model – Option 3 (narrower and deeper option)

Changes in wave climate for Option 3 are similar to Option 1 and focus larger waves towards Skate Harbour and away from the channel and pier. In summary:

- wave heights remain unchanged at the outer entrance (Points A) but increases 0.1m closer to the rock shelf (Point B).
- increases by 0.2m just inside the NW channel extent (Point C).
- decreases up to 0.1m along the berth and ramp (Points D, E and F).
- decrease by 0.03m at the rock revetment (Point G).

Blue indicates a decrease in wave height with yellow/red being an increase.

Change in significant wave height for Option 3 in metres for median conditions (exceeded 50% of the time).
Impacts on wave climate

Wave model - Option 4 (wider and deeper option)

Changes in wave climate for Option 4 tends to focus larger waves towards Skate Harbour the pier. In summary:

- wave heights remains unchanged at the outer entrance (Points A) but increases 0.1m closer to the rock shelf (Point B).
- increases by 0.2m just inside the NW channel extent (Point C).
- increases up to 0.22m along the berth and ramp (Points D, E and F).
- decreases by 0.01m at the rock revetment (Point G).

Blue indicates a decrease in wave height with yellow/red being an increase.
Pier stability

Assessment of the pier stability

With a proposed seabed level of -2.7m MSL to -3.2m MSL, the sheet pile wall was assessed for its ability to withstand the impacts of the deepening. The assessment concluded the following:

- The steel sheet piles would be highly stressed in bending.
- There are six (6) locations along the pier where the sheet piles may be potentially undermined.
- Structural upgrades should be considered for the pier to support heavier cranes i.e. NIRC’s new 60t mobile cranes and a future 100t mobile crane.

Recommendations for pier stability

The following design recommendations were made following assessment of the Kingston Pier’s structural stability:

- Concrete is proposed be used to plug locations underwater where the sheet piles could be undermined.
- Material should not removed adjacent to the toe of existing stonewalls.
- Deepening of the channel at the toe of the pier is to be carried out carefully, potentially dug out with hand-tools to limit risk.
- To confirm assumptions used in the preliminary structural stability assessment, it is recommended that three test pits are to be conducted at the pier, to test seabed properties.
Pier stability

Kingston Pier cross-section

Location where the sheet pile will be undermined

-2.7m MSL

-3.2m MSL
Construction methodology

Construction options

A combination of the following construction options are considered for the Project:

<table>
<thead>
<tr>
<th>Construction Options</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Venturi Suction Pipe</td>
<td>Removal with a diver operated suction pipe may be required for recovering artefacts from sediment material in channel and crevices in the reef.</td>
</tr>
<tr>
<td>Removal with hand-tools</td>
<td>Removal with hand-tools such as hand-drills, hydraulic jack-hammers and underwater saws may be required for specific circumstances, such as cautious removal of seabed around the pier wall.</td>
</tr>
<tr>
<td>Backhoe on a Jack-up Barge</td>
<td>The primary option of removing material from the seabed is proposed to be a backhoe working from a jack-up barge. The jack-up barge can be lifted up to a safe level when wave conditions are too adverse.</td>
</tr>
<tr>
<td>Rock breaker attachment / Erkat Drum Cutter attachment</td>
<td>Rock breaker and Erkat drum cutter attachments can be fitted on the backhoe to allow for breaking up of harder material such as the basalt material present in the channel.</td>
</tr>
</tbody>
</table>
Construction methodology

Recommended Construction Method

1. Major plant and equipment would be mobilised from either the east coast of Australia or New Zealand.
2. A temporary site compound area would be established near the pier to store plant and equipment. A small screening area would be established on the pier.
3. Remove loose sediment material from the existing channel and cracks of calcarenite using a venturi suction pipe. The material would be lifted to the pier for screening of archaeological artefacts.
4. Remove the calcarenite layer with a backhoe mounted on a jack-up barge and hand-tools near the pier. Skip bins would be filled with material and transported for material handling efficiency. The calcarenite rock would be screened for artefacts.
5. Remove the tuff rock with a backhoe mounted on a jack-up barge and hand-tools near the pier. Screening of the artefacts is not expected to be required for the tuff material.
6. Legally dispose of excavated seabed material.
7. Pier stabilisation works would be undertaken to mitigate structural impacts, which would potentially involve concrete plugs and welding of existing sheet piles.
8. If required, a single piled navigation marker would be installed at the rock-shelf edge.
9. The channel bed would be cleared of any stray rocks, and the construction site demobilised.
Disposal of spoil

Disposal Options

Onshore disposal/reuse options consider the follow locations:

• Old Quarry rehabilitation.
• Cascade Pier works (now expected to be unlikely).
• School Playing Fields restoration.
• Behind Watermill Dam.

The Old Quarry is currently considered to be the most preferred option as the spoil can be used to rehabilitate the site.
Additional considerations

Sediment plume mitigation measures

Stakeholders and regulators identified sediment plume during construction to be a potential risk to the marine environment. The following potential preventative measures are being investigated:

- Floating silt curtain.
- Silt curtain fixed to barge.
- Floating flexible hose silt curtain fixed to barge.
- Bubble curtain.
- Water quality monitoring.
Additional considerations

Maritime Archaeology – Archaeological potential

• A number of modern objects have been dropped in the channel (beer bottles, fish bones, animal bones, machinery parts etc.). These objects were rapidly buried and covered in growth, and suggests there is potential for older objects to have been buried in the sediment layer of the channel over time.

• Calcarenite material may have also encapsulated artefacts from nearby shipwrecks.

• Test excavations have been recommended by the archaeologist to gain a better understanding of the archaeological potential.

• If any archaeological artefact is found, it would be set aside, documented by a qualified archaeologist and the Commonwealth Heritage Officer would be immediately notified.
Additional considerations

Marine Ecology

Marine habitats next to Kingston Pier were assessed using a combination of snorkel and diver-based surveys between 18th February and 20th February 2020.

**Intertidal habitats** were dominated by artificial substrate created by the pier. The rock was generally devoid of any significant marine flora and fauna, except for small invertebrates such as crabs and limpets.

The **shallow subtidal habitat** is primarily coarse sand and rubble overlying layers of rock. There is very little benthic fauna present on the areas of sand and moderate cover of macroalgae on the rock. A variety of fish species were also present during the survey.

The **existing channel** is relatively narrow, with larger outcrops of rock and ledges surrounding the area of seabed that has been deepened previously. The cover of macroalgae outside of the channel areas much higher and there is a greater diversity of corals present outside the channel.
Intertidal habitats

Shallow subtidal habitat

Existing channel
Additional considerations

Stability of the rock revetment

There is a dilapidated sheet pile wall at the north-east end of the bay, which is currently protected and stabilised by rock armour. As a result of the channel deepening works, the wave energy at the revetment may either increase, or decrease, depending on width and depth of channel.

Regardless, the condition of the rock revetment indicates that it requires maintenance, as it is showing signs of unravelling with armour rock being washed away from the structure. It is recommended that maintenance of the rock revetment be investigated.
Additional considerations

Survey accuracy and coverage

The following limitations were observed when using existing survey data:

- The Don Taylor hydrographic survey’s coverage and detail is limited to sporadic spot heights. The survey appears accurate, however the lack of spot heights limits the coverage of the survey and adds an uncertainty to the design and volume calculation.

- The Royal Australian Navy Survey provides good coverage, however looks to be inaccurate / incorrect at key locations such as the drop-off at the rock-shelf and the pier edge.

- There are discrepancies between both surveys.

An additional hydrographic survey of the Kingston Pier site is proposed to be undertaken in the near-future to address these limitations, and would inform further revisions of the design and construction documents.
Next steps

Pros and cons of each Design Option

The following pros and cons table has been presented to inform the selection of the design channel.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Option 1 – Minimum width channel and a -2.7m MSL channel depth (for current vessels)</th>
<th>Option 2 – Recommended width channel and a -2.7m MSL channel depth (for current vessels)</th>
<th>Option 3 – Minimum width channel and a -3.2m MSL channel depth (for future vessels)</th>
<th>Option 4 – Recommended width channel and a -3.2m MSL channel depth (for future vessels)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel is suitable for current vessel fleet</td>
<td>✔</td>
<td>✔✔</td>
<td>✔</td>
<td>✔✔</td>
</tr>
<tr>
<td>Channel is suitable for potential future vessel fleet (larger vessels)</td>
<td>X</td>
<td>X</td>
<td>✔</td>
<td>✔✔</td>
</tr>
<tr>
<td>Impact on the wave behaviour in the harbour</td>
<td>✔✔</td>
<td>X</td>
<td>✔</td>
<td>XX</td>
</tr>
<tr>
<td>Impact on the structural integrity of the sheet piles and pier</td>
<td>✔</td>
<td>✔</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Minimal disturbance to marine environment</td>
<td>✔✔</td>
<td>X</td>
<td>✔</td>
<td>XX</td>
</tr>
<tr>
<td>Minimal disturbance to maritime archaeological potential</td>
<td>✔✔</td>
<td>X</td>
<td>✔</td>
<td>XX</td>
</tr>
<tr>
<td>Cost effectiveness of mobilising offshore equipment</td>
<td>XX</td>
<td>✔</td>
<td>✔</td>
<td>✔✔</td>
</tr>
</tbody>
</table>

✔✔ • Option provides the great benefits compared to the other options.
✔ • Option provides some perceived benefits compared to the other options.
- • Option provides a neutral benefit and impact compared to the other options.
✘ • Option has some perceived impacts compared to the other options.
✘✘ • Option has adverse impacts compared to the other options.
Next steps
What we are asking from you...

1. Which is your preferred option from the previous page?

2. Would you like a piled navigation marker at the end of the rock shelf (Location A on page 14) and/or on the bombora (Location C on page 14)?

3. Do you have any objections to land disposal of the excavated seabed material in the old Cascade Quarry?

4. Do you have any other comments on this Stakeholder Consultation Pack or the project in general?
Next steps

Project next steps

1. Input on this Stakeholder Presentation will be gathered from stakeholders.
2. A preferred option will be selected to be developed in further detail.
3. An environmental assessment on the project will be undertaken to obtain the required approvals and permits to carry out the work.
4. A new hydrographic survey of the Kingston Pier Project Site will be carried out to refine the current survey data.
5. Test excavations will be carried out to better understand the maritime archaeological potential in the seabed.
6. Further investigation will be undertaken to explore beneficial reuse of the excavated material.
7. Detailed cost estimation of the preferred option will be developed.
8. Stakeholder feedback will be sought at the 80% Design Report stage.
9. An 80% Design Report and 100% Design Report and Construction Documentation would be delivered with further refinements.
10. A preferred construction contractor will be selected based on cost, methodology, reliability and experience.
Next steps

Consultation opportunities

To provide feedback to the Project Team you can either:

• Provide a written email response to NIKingstonChannel@advisian.com
  o Written submissions are due back via email by Monday 1 June 2020.

• Request for a teleconference meeting with the Project Team (1 hour) – email NIKingstonChannel@advisian.com
  o Requests for teleconference meeting are due by Monday 25 May 2020.
  o Teleconferencing meetings will take place between Tuesday 26 May 2020 and Friday 29 May 2020.
Disclaimer

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