Shoalhaven Heads Estuary Taskforce

Meeting Date: Wednesday, 16 June, 2021
Location: Council Chambers, City Administrative Centre, Bridge Road, Nowra

Attachments (Under Separate Cover)

Index

REPORT

Shoalhaven Heads – Channel Dredging and Beach Nourishment

Stage 1 Tasks

Client: Shoalhaven City Council

Reference: PA2449MARP210507
Status: Final/P01.01
Date: 11 May 2021

Royal HaskoningDHV
Enhancing Society Together

SH21.1 - Attachment 1

Project related

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1 INTRODUCTION

1.1 Background

The estuary foreshore adjacent to River Road in Shoalhaven Heads suffered localised significant erosion following a series of storm events that culminated in the June 2016 East Coast Low (ECL). The erosion was a consequence of the ocean entrance to the Shoalhaven River being open, elevated water levels, large ocean swells penetrating the entrance and very strong winds blowing across the estuary generating local seas. At other times the foreshore adjacent to River Road is relatively sheltered.

Council engaged the Water Research Laboratory (WRL) to undertake an assessment of conceptual management options for the eroded foreshore area (WRL, August 2017). The management approach adopted by WRL, as per their scope of work, focussed on addressing the immediate coastal hazards in the short term while not compromising the ability to implement a longer term management plan for this section of the estuary at a later date. The concept management approach involved:

- embankment toe protection works;
- improvements to stormwater drainage across the beach; and
- moderate beach nourishment.

Nourishment material was considered to likely come from one of two sources, being either dry-notch maintenance activities at Shoalhaven Heads entrance or dredging and maintenance of the navigation channel in the estuary immediately in front of the foreshore area. For costing purposes, dredging from the estuary was considered (expected to be the higher cost, hence conservative). The total nourishment volume adopted for costing purposes was 15,000m^3, representing a widening of the beach by 4 to 5m over a length of 800 to 1,000m. The minimum recommended nourishment was a 2 to 3m widening over a length of 240m, representing 2,000 to 2,500m^3.

Council subsequently engaged Manly Hydraulics Laboratory (MHL) to undertake a review of the WRL assessment of coastal management options (MHL, February 2018). MHL concluded that the WRL recommended management options were justifiable and would provide Council with a viable solution for foreshore erosion management addressing the immediate coastal hazards in the short term. MHL further noted that:

- it would be prudent to utilise a 'large river entrance opening scenario' for detailed design of any embankment protection works to provide a more resilient structure[1]; and
- further consideration could be given to major beach nourishment given the potential benefits and cost savings of this option[2].

Council prepared a Statement of Environmental Effects (SEE) for the River Road Foreshore Management – Coastal Protection Works based on the recommendations of both WRL (2017) and MHL (2018). The proposed coastal protection works outlined in the SEE comprised the following (Shoalhaven City Council, July 2019):

[1] *WRL had adopted a 'small river entrance opening scenario' for concept design, a design life of 10 years and a 20 year ARI storm event.*
[2] *Major beach nourishment was considered to be a widening of 5m over a length of 1,000m. It is inferred that this would be in place of embankment protection works.*

- stormwater outlet improvement works at three locations;
- rock revetment works over a length of approximately 250m;
- beach/sand nourishment over a length of approximately 160m, comprising a volume of approximately 1,060m^3, with sand sourced from dry-notch maintenance activities at Shoalhaven Heads entrance;
- replacement of beach access stairs at two locations;
- clearing of vegetation to facilitate the rock revetment and drainage upgrade works; and
- revegetation works within disturbed, filled or otherwise bare areas above the rock revetment, and within the face of the rock revetment.

The purpose of the beach nourishment was to raise the existing sand level from 0m AHD to 1.3m AHD over the toe of the completed rock revetment in order to:

- provide a more substantial sand buffer for revegetation works along unprotected sections of the foreshore; and
- establish a suitable width of useable beach adjacent to the proposed revetment works and improve the recreational amenity of the beach.

The stormwater outlet improvement works, rock revetment works, and beach access stairs, were based on detailed design drawings prepared by Magryn Engineering Consultants, dated September 2018. The drawings have been upgraded over time.

Construction of the works described in the SEE commenced in early 2021.

In addition to the above works, Council provided Royal HaskoningDHV (RHDHV) a drawing showing a plan and cross-section through the proposed River Road Foreshore Project, being Plan Reference 5490_17 Rev 03 dated 20 February 2020. This drawing indicated more significant sand nourishment along the beach with sand sourced from dredging along the southern side of the adjacent navigation channel. This drawing is reproduced as Figure 1-1.

Council now wish to develop a design for the more significant beach nourishment and channel dredging which addresses a number of objectives in a holistic manner, and in August 2020 engaged RHDHV to provide assistance in progressing this proposal. These objectives include:

- improving foreshore amenity (beach nourishment);
- mitigating ongoing foreshore erosion (beach nourishment in combination with the rock revetment);
- providing a navigation channel, of suitable depth and width for safe navigation, between the Holiday Haven Caravan Park boat ramp and the public jetty at Jerry Bailey Road; and
- consideration of the opportunity to 'value add' to the above works for the benefit of water quality, flooding and ecology.

The intention is to consider options for the dredging and beach nourishment, finalise a preferred option in consultation with the community, develop the design of the preferred option and seek the necessary approvals including completion of the required additional studies. The approvals sought would include a five (5) year licence from the Crown for dredging.

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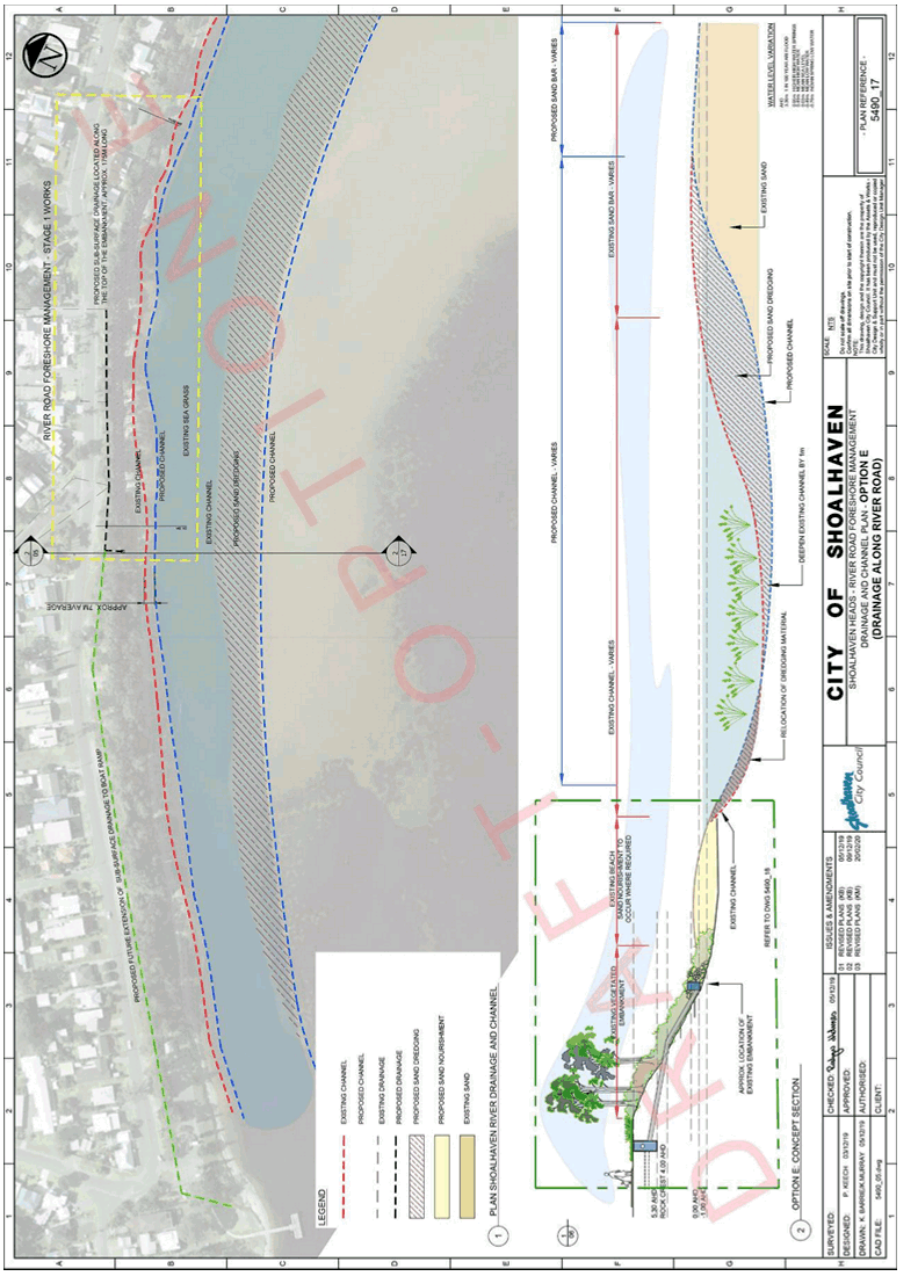

Figure 1-1: Council drawing showing more significant beach nourishment and associated adjacent channel dredging

SH21.1 - Attachment 1

1.2 Scope of Work

The scope of work (as identified in the RHDHV proposal dated 28 May 2020, our reference PA2000_lp01_shoalhaven heads) involved a number of main tasks as listed below. The work was proposed to proceed in two stages, noting that this report addresses Stage 1:

Stage 1:

- site inspection;
- initial discussions with Council staff and community representatives;
- review of existing relevant background information, which would include:
  - Management Options for Improving Flows of the Shoalhaven River at Shoalhaven Heads (WRL, November 2015),
  - River Road Foreshore, Shoalhaven Heads: Assessment of Coastal Management Options (WRL, August 2017),
  - Review of River Road Foreshore, Shoalhaven Heads: Assessment of Coastal Management Options Report (MHL, February 2018),
  - Statement of Environmental Effects: River Road Foreshore Management – Coastal Protection Works (Shoalhaven City Council, Version 1.1, July 2019),
  - Drawings for the River Road Foreshore Management Project prepared by Council and by Magryn Engineering Consultants,
  - Shoalhaven River Hydrographic Survey: September 2005 – November 2006,
  - tidal data for Shoalhaven Heads,
  - available sediment data,
  - available seagrass and mangrove information,
  - available aerial photography,
- confirmation of design objectives;
- development of a minimum of two basic concept options for navigation channel dredging and beach nourishment using the existing available information, taking the form of annotated plans on a recent air photo base which also incorporates the latest available hydrographic survey;
- selection of a preferred concept option in consultation with Council and community representatives;
- preliminary assessment of approvals pathway; and
- identification of additional studies including timeframes and approximate costs.

Stage 2:

- design development of the preferred option which would be expected to involve:
  - an updated hydrographic survey,
  - detailed seagrass mapping,
  - ecological studies,
  - sediment sampling and analysis,

  - confirmation of beach nourishment requirements,
  - confirmation of channel alignment and dimensions having regard to design vessel, relevant standards and guidelines, discussions with the local Boating Services Officer, and expected sedimentation behaviour,
  - consideration of work methods,
  - preparation of cost estimate(s),
  - preparation of drawings,
- confirmation of approvals pathway;
- completion of additional studies;
- preparation of environmental impact assessment documentation; and
- making application for approvals.

1.3 Structure of the Report

The report is structured in the following way:

- Section 2 provides a review of relevant background information;
- Section 3 sets out and discusses the design objectives and design criteria;
- Section 4 outlines the options considered for channel dredging and beach nourishment;
- Section 5 sets out a preliminary assessment of the approvals pathway;
- Section 6 sets out recommendations for additional studies in Stage 2; and
- Section 7 sets the References considered in the Stage 1 reporting.

The report assumes the reader has a good knowledge of the Shoalhaven Heads area, including the physical processes active within the waterways and the current management of these processes.

1.4 Datum

All ground surface levels and river bed levels in the report are generally stated relative to Australian Height Datum (AHD) unless otherwise noted. AHD is approximately the level of Mean Sea Level (MSL) at present.

In some locations in the report levels are stated relative to Chart Datum which is the level of Indian Spring Low Water (ISLW), an extreme low tide level. Chart Datum is the datum commonly adopted for navigation purposes. Where Chart Datum (ISLW) is used, its relationship to AHD is provided.

2 REVIEW OF RELEVANT BACKGROUND INFORMATION

2.1 General

There is a range of background information relevant to a consideration of channel dredging and beach nourishment at Shoalhaven Heads. This information is reviewed in the following sections, generally in chronological order. The relevance of the information to channel dredging and beach nourishment is also noted.

2.2 Shoalhaven River Hydrographic Survey: September 2005 – November 2006

Detailed hydrographic survey information is essential in order to:

- identify available water depths in recognised navigation channels and compare these to the required depths for safe navigation and hence the need for any dredging;
- identify any opportunities for creation of a new channel(s), where appropriate; and
- assess volumes of dredging and thereby the volumes available from dredging for purposes of beach nourishment.

The most recent comprehensive hydrographic survey available for the study area is that completed in September 2005 – November 2006 by the then NSW Department of Natural Resources under the Estuary Management Program. This hydrographic survey has been adopted for the Stage 1 report. Due to the age of this information, a detailed up-to-date hydrographic survey would be required as part of the Stage 2 scope of work.

2.3 Management Options for Improving Flows of the Shoalhaven River at Shoalhaven Heads (WRL, 2015)

This study was designed to identify and investigate options that may increase water circulation in the Shoalhaven River estuary at Shoalhaven Heads. The study was in response to local community concerns that long periods of closure of the river entrance at Shoalhaven Heads will cause the area to become an estuarine backwater with poor water quality and increased sedimentation.

The WRL (2015) study is of interest to the channel dredging and beach nourishment study in that one of the objectives of the latter study is to consider opportunities to 'value add' to the channel dredging and beach nourishment works for the benefit of water quality, flooding and ecology.

The relevant findings of the WRL (2015) study are summarised below:

- from an ecosystem health perspective, the Shoalhaven Heads area is presently in 'good' condition; measurements of poor water quality are generally sporadic in nature and appear related to runoff events following rainfall[3];

[3] *It is understood that since the WRL (2015) study Council has undertaken works to address the sporadic water quality issues associated with rainfall events, which included sewage overflows (pers comm Kelie Clarke, Shoalhaven City Council). Documentation of these works should be included within the Stage 2 tasks.*

- analytical calculations, water quality results and numerical modelling simulations suggest the Shoalhaven Heads system is typically well flushed. The existing good flushing times (when the estuary is closed) are typically associated with the efficient tidal exchange provided by Berry's Canal;
- available data suggests sedimentation within the Shoalhaven Heads area is a natural process. Infilling occurs after the entrance has been opened and continues until the entrance closes to the ocean, largely due to the increasing flood tide dominance and entrainment of sand within the open coast wave zone. Once closed, estuarine processes dominate but the sediment is typically removed following large floods; and
- shallow dredging to increase circulation within the Shoalhaven Heads region has been shown to be largely ineffective, because Berry's Canal is already highly efficient and tidal flushing rates within the vicinity of Shoalhaven Heads are sufficiently short.

Notwithstanding the findings of WRL (2015), it is suggested that shallow channel dredging in the Shoalhaven Heads region could be considered in order to enhance local wind driven current circulation/mixing, accepting that tidal flushing will continue to be dominated by Berry's Canal. This is further discussed in Section 4.

2.4 River Road Foreshore, Shoalhaven Heads: Assessment of Coastal Management Options (WRL, 2017)

Relevant information from WRL (2017) has been briefly summarised in Section 1.1 Background, but is further summarised below:

- a minimum extent of beach nourishment was considered to be a widening of the beach by 2 to 3m over the length of the rock revetment (approximately 250m); a significant improvement to beach amenity was considered to involve a 4 to 5m widening of the beach over the entire foreshore (approximately 1,000m length)[4];
- a so-called 'moderate' extent of beach nourishment was recommended, to be undertaken in the short to medium term following construction of the embankment protection works (rock revetment);
- two sources of nourishment sand were identified; sand from maintenance of the dry notch at the entrance to the Shoalhaven River and sand from dredging of the existing navigation channel situated along the foreshore of Shoalhaven Heads[5]; and
- the estimated volume of nourishment sand varied from a low figure of 2,000 to 2,500m^3 (2 to 3m widening over a length of approximately 250m), up to a high figure of 15,000 to 20,000m^3 (4 to 5m widening over a length of approximately 1,000m).

[4] It is important to note that the dimensions of 2 to 3m and 4 to 5m represent a widening (width gain) of the beach, not the final beach width, i.e. the dimensions are additional to the existing beach width.
[5] It has been generally accepted in discussions with Council that sand for the nourishment undertaken in association with construction of the rock revetment (250m foreshore length) would be sourced from the dry-notch maintenance activities, as this sand is required in the short term and any dredging would not be approved in that time frame (revetment works commenced early in 2021), and that the more extensive beach nourishment over the greater foreshore length would source sand from the channel dredging. It is also noted that the nourishment was intended to cover only the toe of the rock revetment. The sand level specified in the Technical Specification for the rock revetment works was 1.3m AHD (the crest level of the rock revetment is 4.0m AHD).

2.5 Review of River Road Foreshore, Shoalhaven Heads: Assessment of Coastal Management Options (MHL, 2018)

MHL (2018) generally concurred with the findings of WRL (2017). In terms of beach nourishment, MHL noted that:

- beach nourishment in the short to medium term following construction of the rock revetment works would be highly beneficial to the amenity of the beach, in partially burying the revetment to a level of around 1.3m AHD and in providing a sand buffer against future erosion events; and
- further consideration could be given to 'major' beach nourishment (5m widening over approximately 1,000m), in place of the rock revetment works, with ongoing nourishment to reinstate a protective sand buffer if or when required.

Subsequently, following consideration of WRL (2017) and MHL (2018), Council adopted the option of rock revetment works coupled with a minor amount of sand nourishment (approximately 1,060m^3 over approximately 130m), sourced from dry-notch maintenance, as described in the SEE for the River Road Foreshore Management project (Shoalhaven City Council, 2019) and subsequently incorporated in the Technical Specification for the rock revetment works. It was intended that larger scale nourishment works would be undertaken at a later time in conjunction with navigation channel dredging.

2.6 Tidal Data for Shoalhaven Heads

Knowledge of tidal information is essential for the design of navigation channels to ensure safe navigation, and for the design of beach nourishment works to ensure required amenity outcomes, e.g.. minimum width of dry beach at a given tide level.

Information on tidal planes at Shoalhaven Heads is available from WRL (2017), for two conditions of the Shoalhaven River entrance; namely entrance closed and entrance open. This information is summarised in Figure 2-1, relative to AHD.

It is evident that when the entrance is open rather than closed:

- tidal range is greater (mean spring range 1.01m versus 0.73m);
- high tide is higher relative to AHD (e.g. MHWS 0.594m versus 0.434m); and
- extreme low tide is lower relative to AHD (ISLW -0.667m versus -0.516m).

For the above reasons, the condition of 'entrance open' is the critical condition for design of a navigation channel and beach nourishment (when the entrance is closed the available navigation depth would be greater than the minimum requirement and the dry beach would be wider than the minimum target width). It is also relevant, based on historical records over the period 1936 to 2016, that the entrance is open more so than it is closed, approximately 67% of the time versus 33% (WRL, 2017). Hence, adopting the entrance open condition also caters for the greater percentage of time, on average.

Table 2-1 Tidal planes at Shoalhaven Heads (WRL, 2017)

Tidal Plane	Level (m AHD)	
	Entrance closed	Entrance open
High High Water Solstices Springs (HHWSS)	0.738	0.947
Mean High Water Springs (MHWS)	0.434	0.594
Mean High Water (MHW)	0.375	0.502
Mean High Water Neaps (MHWN)	0.315	0.410
Mean Sea Level (MSL)	0.067	0.090
Mean Low Water Neaps (MLWN)	-0.181	-0.231
Mean Low Water (MLW)	-0.240	-0.323
Mean Low Water Springs (MLWS)	-0.299	-0.415
Indian Spring Low Water (ISLW)	-0.516	-0.667

2.7 Available Sediment Data

A knowledge of sediments in the area to be dredged is fundamental in order to assess factors such as dredging work methods, the feasibility of beneficial reuse of the sediments for beach nourishment, and environmental controls.

There would appear to be limited available sediment data in the Shoalhaven Heads area. Carvallo et al (2017) have noted that just upstream of Shoalhaven Heads the sediments comprise coarse silts and that close to the river entrance the grain size increases to medium sand (0.25 to 0.50mm) associated with the marine tidal delta, which forms after a flood breakout.

Based on the work by Carvallo et al (2017), an understanding of physical processes in the Shoalhaven Heads area, site inspections, and review of historical vertical aerial photography, it would be expected that materials to be dredged in the area would be predominantly sand with minor proportions of silt and possibly clay size fractions. The sediments may also contain organic matter, e.g. seagrass detritus and leaf litter.

Preparation and implementation of a comprehensive sediment sampling and analysis plan (SAP) would be required as part of the Stage 2 scope of work. In addition to developing an understanding of the physical characteristics of the sediments such as the particle size grading, it would be necessary to test the sediments for geochemical characteristics (contamination) and acid sulfate soils. Laboratory scale settling tests could also be carried out on representative samples to assist in the design of settling ponds and to inform potential environmental impacts and required environmental controls.

2.8 Available Seagrass and Mangrove Information

Knowledge of seagrass in the study area, e.g.. species, extent, variability, is essential as it would affect the potential environmental impact of dredging and beach nourishment, such as through direct removal or smothering.

Seagrass is evident fringing the existing navigation channel, based on field inspections and review of vertical aerial photography. Some mapping of seagrass was undertaken for purposes of the design of the

rock revetment and was included on design drawings prepared by Magryn & Associates. This was based on examination of recent Nearmap images.

The extent of Estuarine Macrophytes (seagrass, mangrove and saltmarsh) in the general study area has also been examined utilising the Fisheries NSW Spatial Data Portal (accessed May 2021). The extent of Estuarine Macrophytes is shown on Figure 2-1 (seagrass in blue, mangroves in yellow, and saltmarsh in green). It is evident that extensive areas of seagrass exist within and adjacent to the existing navigation channel.

Detailed seagrass mapping including ground truthing would be required as part of the Stage 2 scope of work. The potential harm to marine vegetation (seagrass) associated with the proposed beach nourishment and channel dredging would be a significant issue to be addressed in the environmental impact assessment.

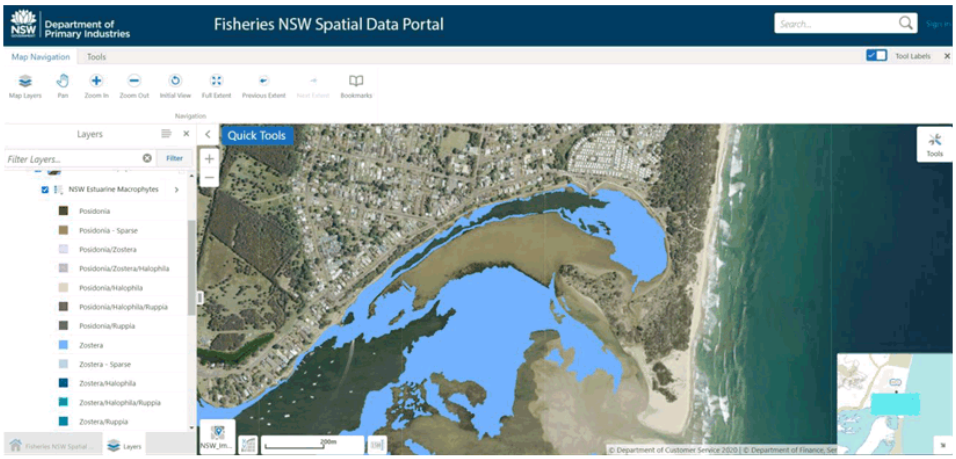

Figure 2-1: Extent of Estuarine Macrophytes near Shoalhaven Heads

(source: Fisheries NSW Spatial Data Portal, Department of Primary Industries, May 2021)

There are no mangrove stands shown on Fisheries NSW mapping within or immediately adjacent to the existing navigation channel or beach area. Council has advised it has a permit (Permit PN19/338) from the Department of Primary Industries to harm marine vegetation associated with mangrove seedling maintenance within Lot 7005 DP 1075719 adjacent to River Road Shoalhaven Heads (within intertidal land zoned for public recreation). The extent of this area is shown on Figure 2-2 and comprises the intertidal zone extending from opposite the intersection of Mathews Street and River Road to approximately 200m east of the boat ramp at the Holiday Haven Caravan Park.

This permit was issued for an interim 3 year period prior to estuary wide consideration of this matter as part of the pending Coastal Management Program for Shoalhaven River, and has a requirement for reporting following annual clearance works. Information provided by Council state that the most recent clearance works took place on 17 December 2020 between 7 am and 9:10 am, at low tide, and that there were a total of 794 propagules removed, of which 352 had established but were small (<15 cm height) and 442 had not become established. Propagules were removed by hand. No seedlings were transplanted.

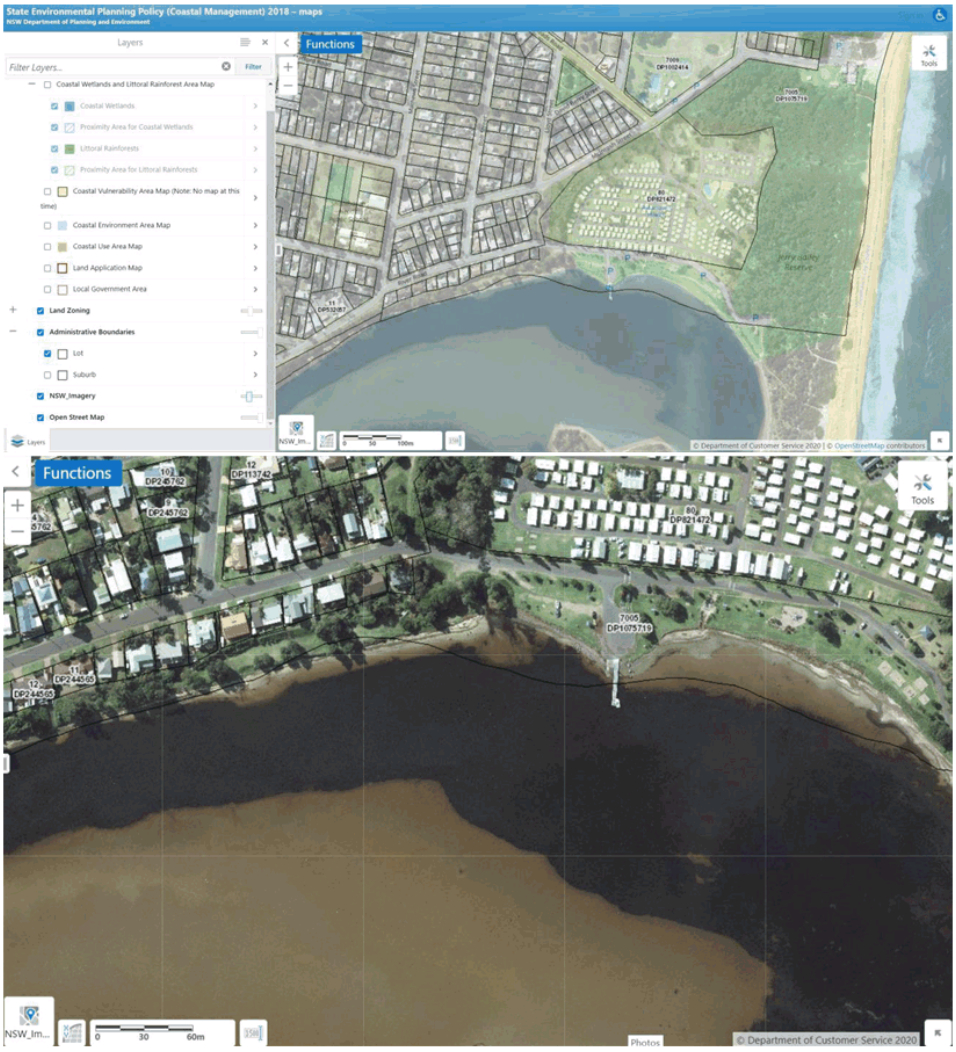

Figure 2-2: Area subject to mangrove seedling maintenance under Permit PN19/338

(source: Coastal Management SEPP NSW Spatial Data Portal, Department of Primary Industries, May 2021)

2.9 Available Aerial Photography

Aerial photography is a valuable tool for the interpretation of coastal and estuary processes including river entrance scour and subsequent closure, and mapping of features such as channels, flood tide deltas, major sediment movement pathways, and seagrass.

High resolution images from Nearmap are available for Shoalhaven Heads from 2010 and are informative, showing a range of entrance configurations and sedimentary patterns. Figure 2-3 shows an example aerial photograph of an entrance open condition and Figure 2-4 shows an example aerial photograph of an entrance closed condition. Based on historical research included in WRL (2017) the entrance is open more so than it is closed; it is open approximately 67% (two thirds) of the time and closed approximately 33% (one third) of the time.

Figure 2-3 (entrance open) shows the entrance tidal channels, recurved sand spits either side of the channel and the marine flood tide delta within the entrance. In Figure 2-4 (entrance closed) the sandy beach berm has infilled the entrance channel as a result of wave driven open coast sediment transport processes. Remnant channels exist within the marine flood tide delta.

The area of the existing navigation channel along the foreshore adjacent to River Road, and the extensive intertidal sand bank immediately to the south of the channel, are relatively stable compared to the highly dynamic zone in the entrance area.

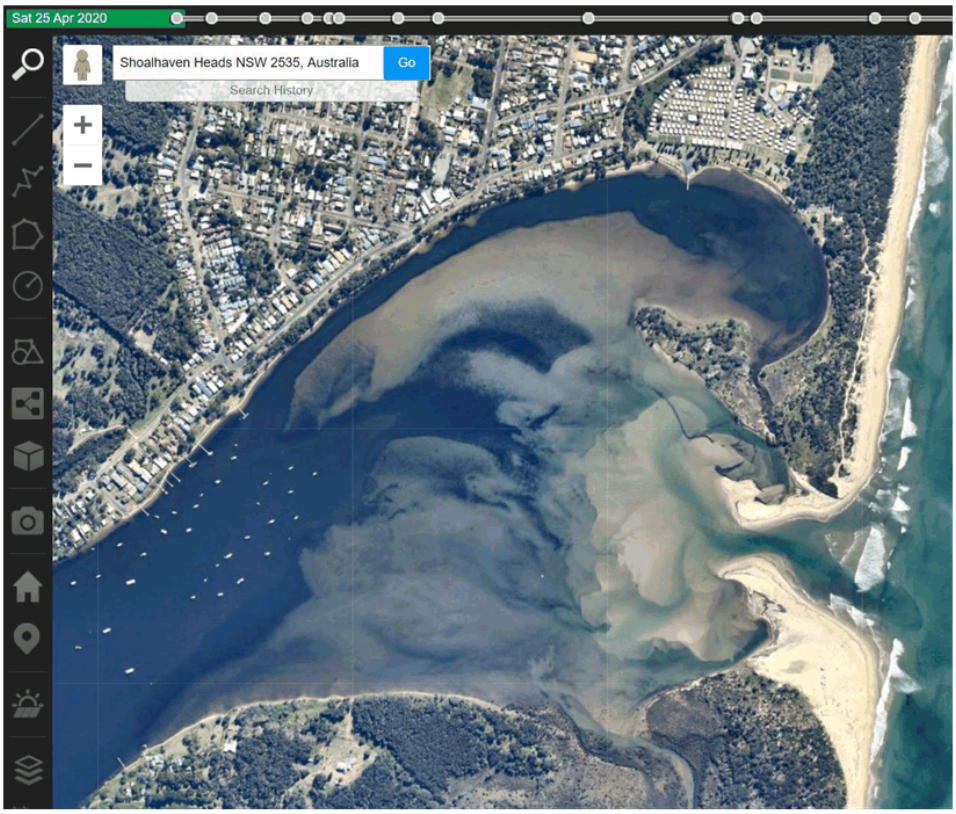

Figure 2-3: Example aerial photograph of an entrance open condition (Nearmap image 25 April 2020)

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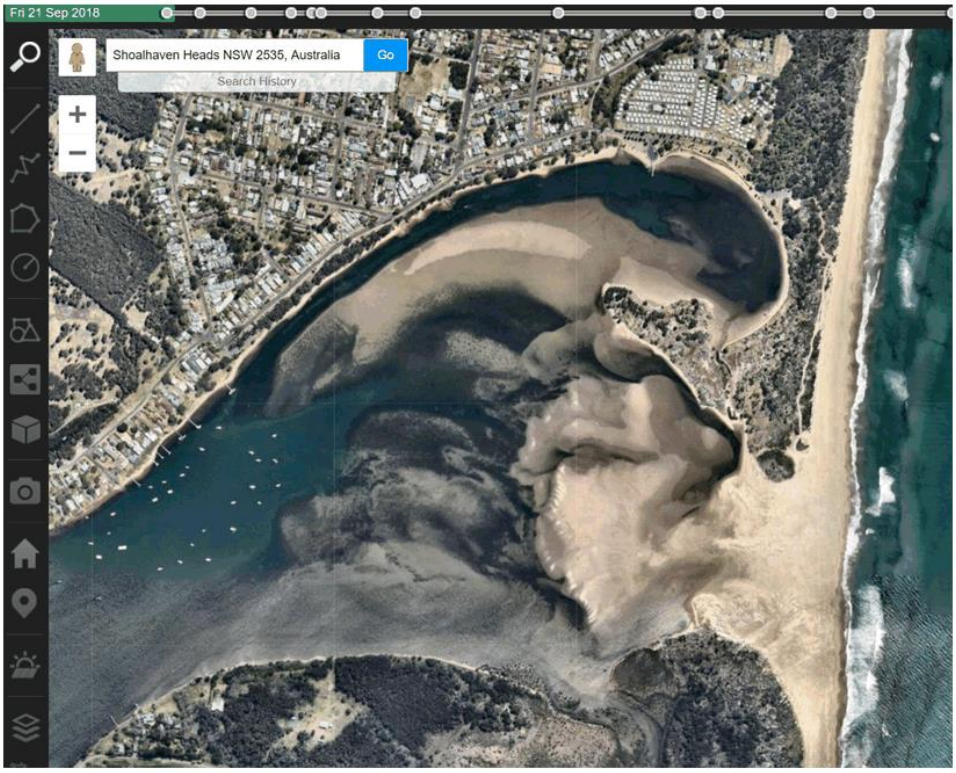

Figure 2-4: Example aerial photograph of an entrance closed condition (Nearmap image 21 September 2018)

3 DESIGN OBJECTIVES AND DESIGN CRITERIA

3.1 General

The objectives of the beach nourishment and channel dredging were listed in Section 1.1 Background and are reproduced below, followed by a discussion and development of design criteria:

- improving foreshore amenity (beach nourishment;
- mitigating ongoing foreshore erosion (beach nourishment in combination with the rock revetment);
- providing a navigation channel, of suitable depth and width for safe navigation, between the Holiday Haven Caravan Park boat ramp and the public jetty at Jerry Bailey Road; and
- consideration of the opportunity to 'value add' to above works for the benefit of water quality, flooding and ecology.

3.2 Beach Nourishment

3.2.1 General

The beach nourishment addressed in this report is the nourishment which would take place subsequent to the minor nourishment to be undertaken as part of the rock revetment works. This minor nourishment involves placement of sand to a level of 1.3m AHD over a length of 130m along the revetment, with material sourced from the dry-notch maintenance, as described in the Technical Specification for the works.

Beach nourishment material for the nourishment described in this report would be sourced from channel dredging rather than notch maintenance. Accordingly, a balance between the beach nourishment volume and channel dredging volume needs to be considered. The beach nourishment volume is dependent on the target additional beach width, the cross shore nourishment profile, and the length of foreshore to be nourished.

3.2.2 Target additional beach width

Based on WRL (2017), MHL (2018) and discussions with Council and community representatives, the proposed target additional beach width for concept design purposes is nominally 5m. This is the additional dry beach width above high tide level and would represent a significant increase in recreational amenity and foreshore access compared to the existing situation, where the existing beach width above high tide level is typically less than 2m (refer Figure 3-1). It would also provide additional buffer to foreshore erosion.

Figure 3-1: View of foreshore looking upstream around low tide showing existing relatively narrow beach width above high tide level

The target additional beach width of 5m may not necessarily be uniform along the full length of the foreshore as the existing beach width is variable, influenced in particular by the existence of sand deltas or lobes near stormwater outlets.

Detailed design of the widening would be based on a detailed survey of the foreshore and consideration of sedimentary processes, including consideration of ongoing modifications to the existing stormwater outlet arrangements as part of the River Road Foreshore Management project.

3.2.3 Cross Shore Nourishment Profile

Available survey indicates the existing dry beach is at a level of approximately 1.3 to 1.5m AHD. The minor beach nourishment to be undertaken in association with the rock revetment has a proposed upper (dry beach) level of 1.3m AHD as noted previously. For purposes of concept design of the nourishment to be undertaken in association with the channel dredging, a slightly higher upper beach level of 1.5m AHD has been adopted. This level would be reviewed during detailed design based on detailed survey of the foreshore and performance of the minor nourishment beach profile. Monitoring of the performance of the minor nourishment profile (movement of the sand) has been incorporated into the mitigation measures for the rock revetment project (Shoalhaven City Council, 2019). The monitoring includes establishment of a minimum of four photo-points along the river foreshore and completion of photo surveys prior to commencement of the works, upon completion of the works, and thence every three months for two years.

The proposed lower level of the nourishment profile for concept design purposes is -2m AHD, having regard to the proposed water depth in the adjacent navigation channel (refer Section 3.3). Again this level would be reviewed during detailed design.

The cross shore slope of the existing beach varies between approximately 1 Vertical to 9 Horizontal (1V:9H) and 1V:15H based on the 2005-2006 hydrographic survey, depending on location along the beach. A design slope of 1V:7.7H was proposed in the SEE for the minor nourishment to be undertaken in association with the rock revetment (Shoalhaven City Council, 2019). The Technical Specification for the rock revetment works subsequently specified the minor nourishment to taper from a level of 1.3m AHD to the existing beach level over a 15m width.

For purposes of concept design of the nourishment to be undertaken in association with channel dredging, an average beach slope of 1V:10H has been adopted. During detailed design it is possible this slope may be able to be steepened followed review of an updated detailed hydrographic survey and the performance of the minor nourishment beach profile.

Based on an upper beach level of 1.5m AHD and a lower beach level of -2m AHD, and a target additional beach width of 5m, the average nourishment volume per metre length of foreshore would be 17.5m^3/m.

3.2.4 Length of beach nourishment and overall nourishment volume

For concept design purposes an overall length of foreshore to receive nourishment sand from channel dredging of 1,000m has been adopted. This length corresponds to the distance from the boat ramp at the Holiday Haven Caravan Park to the public jetty at Jerry Bailey Road.

Based on the above length of 1,000m and a nourishment volume per metre length of foreshore of 17.5m^3/m, the total nourishment volume would be 17,500m^3. This is similar to the nourishment volume of 15,000 to 20,000m^3 outlined in WRL (2017) corresponding to a significant improvement in beach amenity at Shoalhaven Heads.

3.2.5 Covering the rock revetment with nourishment sand

In discussions with community representatives the view has been expressed that nourishment sand should be used to cover the rock revetment entirely up to its crest level of 4.0m AHD in addition to widening the beach. It is understood this is due to a concern regarding the visual appearance of the rock revetment.

For a number of reasons covering the rock revetment up to 4.0m AHD with nourishment sand is not considered to be the preferred approach:

- it is already proposed as part of the contract for construction of the rock revetment to infill the voids in the primary rock armour between 1.5m AHD and 4.0m AHD with a suitable growth medium and to plant these pockets with understorey species (grasses, herbs and climbers). These details are shown on Magryn & Associates Drawing 18343-1 and Drawing 18343-3;
- sand placed over the rock revetment in the zone from 1.5m AHD to 4.0m AHD would not be stable at the revetment slope of 1V:1.5H. The seaward face of a natural sandy dune system is flatter than 1V:1.5H, typically 1V:3H or flatter, except where undercut by erosion; and

- in the event sand was placed over the rock revetment at a flatter slope of say 1V:3H and then a sandy beach berm with an additional width of 5m and level of 1.5m AHD was created further seaward, the planform alignment of the beach over the length of the rock revetment would be further seaward than for the remainder of the foreshore by a distance of 3 to 4m. It is likely over time that this 'disequilibrium bulge' in the beach planform alignment would be preferentially redistributed by natural sorting processes and the rock revetment zone may become a 'pinch point' for alongshore access. This is illustrated in Figure 3-2.

Having said the above, it will be important for the proposed planting within the voids in the primary rock armour and the establishment of these plants to be carried out strictly in accordance with the Technical Specification.

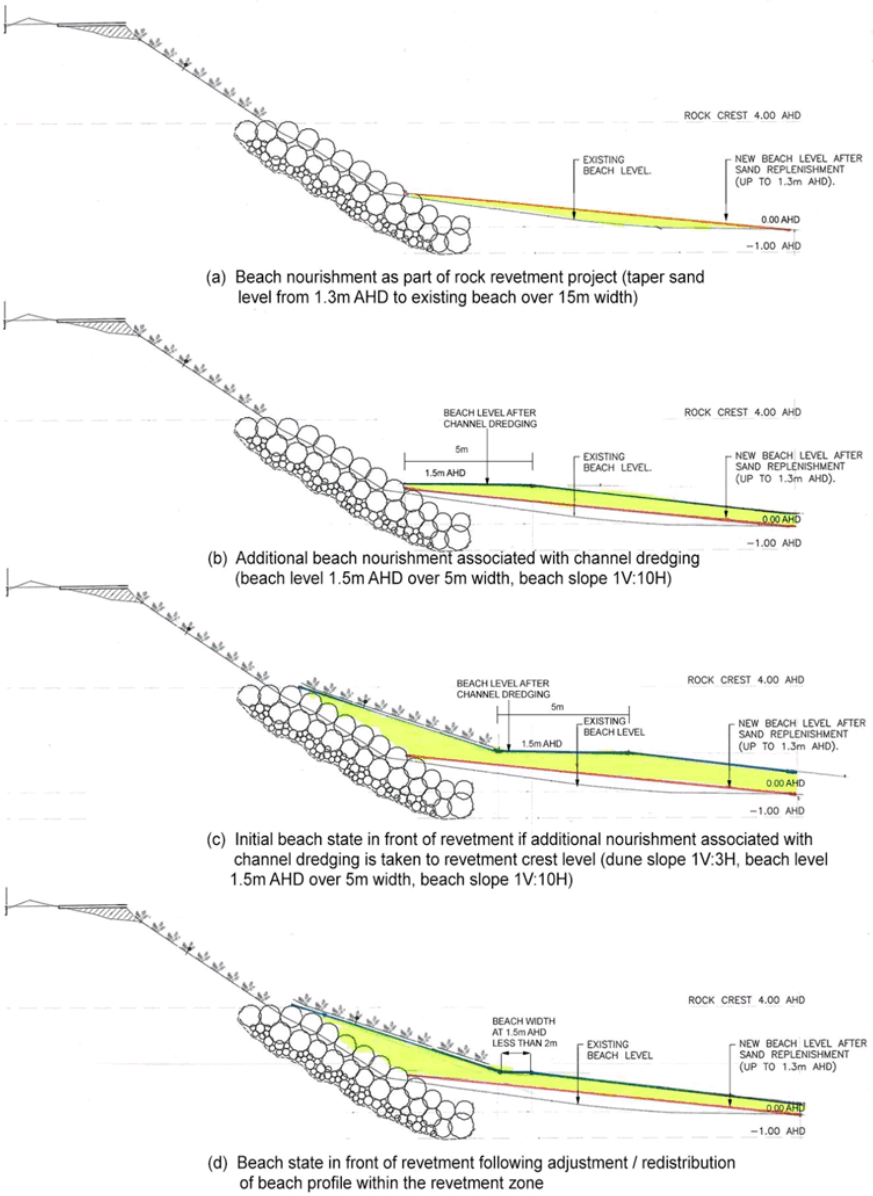

Figure 3-2: Illustration of development of a possible 'pinch point' in front of the rock revetment

3.2.6 Ongoing nourishment requirements

There are a number of mechanisms for erosion of sand placed on the beach, including wind generated waves, vessel wash, ocean storms (open entrance conditions), flooding and stormwater flows. There are however no natural sand replenishment mechanisms, unlike on open coast beaches where long low swell waves following erosion events move sand from offshore bar systems back onto the beach.

For the above reason, a need for ongoing nourishment of the beach can be expected. The rate at which renourishment would be required is difficult to predict and is likely to be related predominantly to the frequency and severity of ocean storms (entrance open) and flooding events, and the pervasiveness of local wind generated waves.

3.3 Navigation Channel

3.3.1 General

The concept design of a safe navigation channel linking the Holiday Haven Caravan Park boat ramp and the public jetty at Jerry Bailey Road, in line with Council's objective stated in Section 1.1, requires consideration of a design vessel and relevant channel design guidelines, which determine the necessary channel dimensions.

The existing navigation channel linking the above two locations is situated immediately adjacent to the foreshore. A consequence of the nourishment concept discussed earlier is that the beach widening would partially infill the existing channel. Two broad options thereby exist for the alignment of the channel:

- shift the existing channel to the south-east by dredging along the northern edge of the sand bank thus retaining, more or less, the alignment of the existing channel; and
- consider creation of a new channel alignment by cutting a channel across the sand bank in a southerly direction from the Holiday Haven Caravan Park boat ramp and proceeding upstream on the southern side of the sand bank.

The above options are considered further in Section 4.

It is noted that Council has advised the current highest priority for upgrading of boat ramps at Shoalhaven Heads is the Wharf Road boat ramp further upstream in the Shoalhaven River, as shown in Figure 3-3. If this facility is upgraded within the next two years, the design of the navigation channel to the Holiday Haven Caravan Park boat ramp may require further consideration.

Figure 3-3: Wharf Road Boat Launching Ramp, Shoalhaven River (source google maps)

3.3.2 Design vessel

The design vessel for the navigation channel would be a representative larger vessel launched at the Holiday Haven Caravan Park boat ramp. The size distribution of vessels launched at the boat ramp is not available, but is expected to generally comprise vessels not exceeding 4 to 5m in length (refer Figure 3-4 and Figure 3-5).

Figure 3-4: Example vessel launched at Holiday Haven Caravan Park navigating upstream in channel around low tide

Figure 3-5: Example vessel launched at Holiday Haven Caravan Park navigating upstream in channel around low tide

For concept design purposes the design vessel has been conservatively taken to correspond to the maximum length limit for trailerable vessels of 7.5m (RMS, 2015). This is not to say that channel dredging has the aim of promoting increased use of the channel by larger vessels than may have used the channel historically. It is simply adopting a conservative position for feasibility assessment purposes. The design vessel would be reviewed during detailed design based on investigation of the typical maximum size vessels launched at the Holiday Haven Caravan Park boat ramp.

According to Australian Standard AS3962:2020 Marina Design, a 7.5m length power vessel has the following relevant particulars:

- draft 0.9m (95th percentile, i.e.. only 5% of vessels of length 7.5m would have a draft greater than 0.9m); and
- beam 3.3m.

3.3.3 Channel dimensions

The key channel dimensions are depth (measured below a particular reference water level) and the width measured at the navigation depth. In terms of assessment of width, it is assumed that the channel is two way, i.e. vessels would pass in the channel, travelling in opposite directions. This is observed on site to be the case. It is also relevant that the channel is used by stand-up paddle boarders, kayaks, and for tow tube activities (refer Figure 3-6 and Figure 3-7).

Figure 3-6: Small craft launched at Holiday Haven Caravan Park navigating upstream in the channel past a stand-up paddle boarder

Figure 3-7: Tow tube activities being undertaken in the navigation channel

The appropriate reference water level to adopt for channel design is MLWS, as it is accepted that there is only a small probability that vessels would be navigating along the channel during an extreme low tidal level such as ISLW. As noted in Section 2.6, the entrance open condition is the critical condition, in which case from Table 2-1 the level of MLWS is -0.415m AHD. The water level would only be lower than MLWS (giving a shallower depth) for less than 5% of the time.

In accordance with AS3962:2020 the design channel depth below the reference water level should be the sum of the following factors:

- vessel draft (0.9m);
- half the significant wave height (H_s) for vessel movements resulting from wind generated waves and vessel wakes (½ of 0.4m = 0.2m)[6];
- minimum underkeel clearance of 300mm, based on a 'soft bed', in this case sand; and
- an allowance for siltation in the channel, taken to be nominally 200mm for concept design purposes.

[6] *H_s is a common representative measure of the wave height within a group of waves and is equal to the average height of the highest one third of the waves in the group. A value of 0.4m for H_s has been adopted for concept design purposes based on experience, being the likely significant wave height which could be experienced when boating within the channel. Note that some 14% of waves will be higher than the significant wave height and the maximum wave height experienced could be up to two times higher than the significant wave height.*

Based on the above, the design channel depth would be 0.9 + 0.2 + 0.3 + 0.2 = 1.6m below the reference water level of -0.415m AHD, i.e. a bed level of -2.015m AHD. A bed level of -2.0m AHD has been adopted for concept design purposes.

In terms of channel width, in accordance with AS3962:2020, the minimum width for an entrance channel (two way navigation) should be the greatest of:

- 20m;
- (L + 2)m where L is the length of the longest vessel using the channel, therefore 7.5m + 2m = 9.5m; and
- (5B)m where B is the beam of the broadest monohull using the channel, therefore 5 x 3.3m = 16.5m, assuming two large vessels may pass in the channel.

Based on the above, a channel width of 20m has been adopted for concept design purposes.

4 OPTIONS ASSESSMENT FOR NAVIGATION CHANNEL DREDGING AND BEACH NOURISHMENT

4.1 Channel Alignment

As noted in Section 3.3.1, a consequence of the nourishment concept for the foreshore is that the beach widening would partially infill the existing navigation channel. Two broad options thereby exist for the alignment of the channel:

- shift the existing channel to the south-east by dredging along the northern edge of the sand bank thus retaining, more or less, the alignment of the existing channel; and
- consider creation of a new channel alignment by cutting a channel across the sand bank in a southerly direction from the Holiday Haven Caravan Park boat ramp and proceeding upstream on the southern side of the sand bank.

The alignment of the existing channel, situated between the foreshore and the sand bank, is relatively stable, as evidenced in a review of historical vertical aerial photography. This is the recognised navigation channel and is defined by piled channel markers.

On the other hand, a new channel alignment established by cutting a channel across the sand bank in a southerly direction from the Holiday Haven Caravan Park boat ramp and proceeding upstream on the southern side of the sand bank would be located in a significantly more dynamic area. Such a channel would be subject to the processes of scour during freshwater flood events and sand deposition during the formation of the flood tide delta and ultimate closure of the entrance (refer Figure 4-1 and Figure 4-2). The channel would therefore be much less stable than a channel aligned, more or less, along the existing channel alignment, and would require greater maintenance to ensure safe navigation.

For the reasons above, retention of the existing channel alignment on the northern side of the sand bank is considered the preferred option.

Although the channel would be situated in a relatively stable area from a sedimentary processes viewpoint, there are a range of significant environmental factors which would need to be considered in a subsequent environmental impact assessment associated with the proposed dredging and beach nourishment. The existence of extensive seagrass has been highlighted in Section 2.8 and would be a significant factor in the environmental impact assessment. In addition, other significant factors would include potential impact to threatened species, e.g. migratory shorebirds, and to foraging habitat. The risk of erosion of the beach nourishment material during floods and its transport to sensitive areas downstream would be a specific consideration.

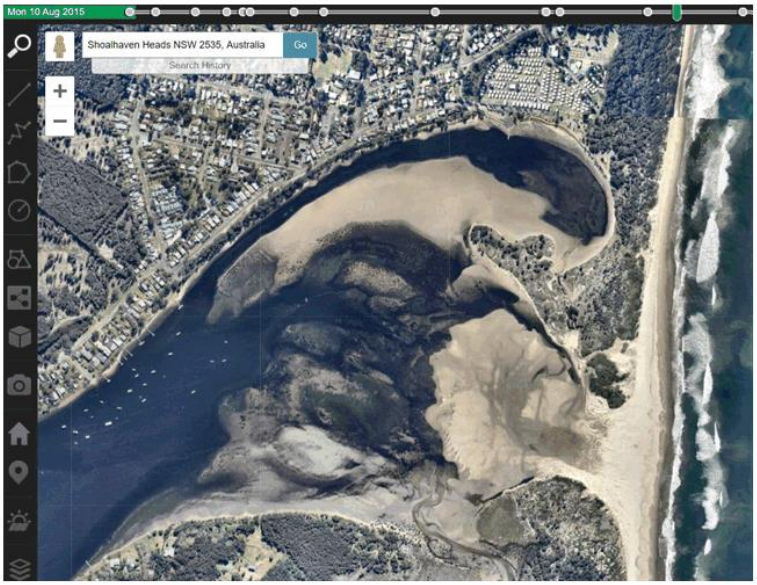

Figure 4-1: Nearmap image of closed entrance in August 2015 showing extensive flood tide delta and shallow zones on the southern side of the sand bank

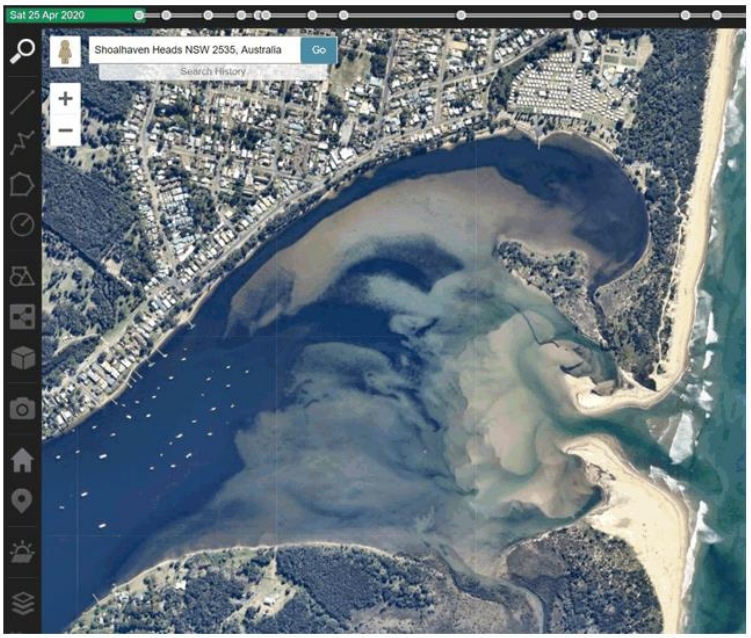

Figure 4-2: Nearmap image of an open entrance in April 2020 showing formation of the flood tide delta and shallow zones on the southern side of the sand bank

4.2 Conceptual Design of Navigation Channel Dredging and Beach Nourishment

A conceptual design for the navigation channel dredging and beach nourishment has been prepared based on adoption of the existing channel alignment and the design criteria outlined in Section 3.3, namely:

- design bed level of channel : -2.0m AHD
- design width of channel : 20m
- beach nourishment:
  - target additional beach width: 5m
  - upper beach level : 1.5m AHD
  - cross shore beach profile : 1V:10H

A plan of the channel is shown in Figure 4-3 based on the September 2005 – November 2006 hydrographic survey. Cross-sections at five locations along the channel, viewed looking downstream, are shown in Figure 4-4 and Figure 4-5. The green shading depicts sand placement; the red shading depicts dredging.

The estimated volume of dredging to the design profile is in the order of 20,000 to 25,000m^3 based on the September 2005 – November 2006 hydrographic survey. Accordingly, it is of the same order of magnitude or somewhat greater than the volume calculated for beach nourishment of 17,500m^3 (refer Section 3.2.4).

During further design development, following completion of an up to date hydrographic survey and land survey, and refinement of design criteria, it would be necessary to find a balance between the dredging volume and nourishment volume. The balance would also need to take into account any bulking of the dredged material and an overdredging allowance below the design profile.

Bulking refers to the change in volume of the dredged material which occurs during dredging and placement of the material in a fill area due to the change in density of the material. Determination of the bulking factor requires a geotechnical assessment of the material to be dredged and an understanding of the level of compaction to be carried out in the nourishment area. For sands, bulking could increase the volume by up to 10 to 20%.

Overdredging refers to the additional dredging which takes place below the design profile in order that the Contractor can guarantee achievement of the design profile, having regard to survey accuracy, and due to the method of operation of the dredging equipment. For the likely method of dredging for the navigation channel at Shoalhaven Heads, average overdredging below the design profile could be in the order of 0.2 to 0.3m.

Royal HaskoningDHV

Project related

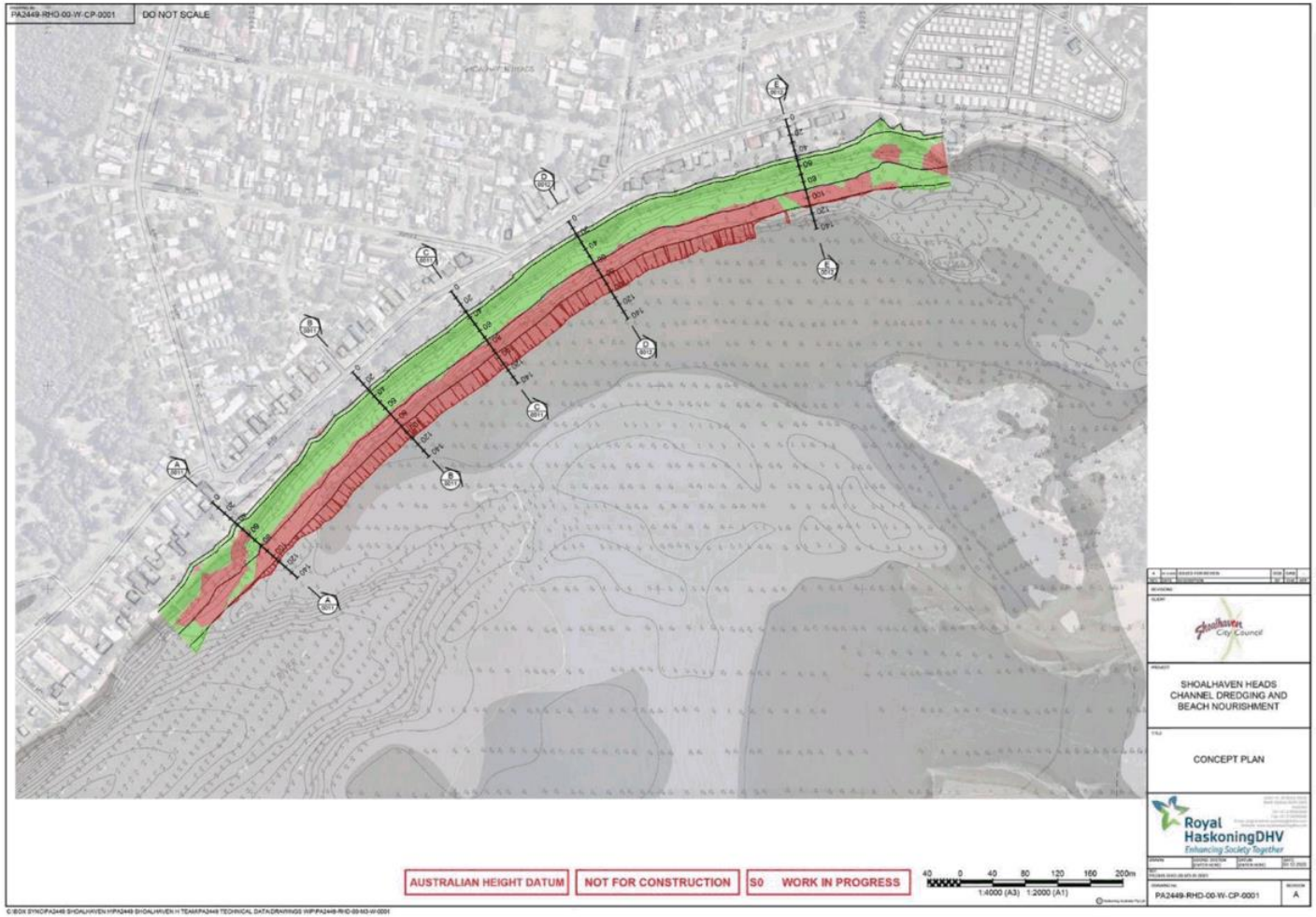

Figure 4-3: Plan view of the conceptual navigation channel dredging and beach nourishment

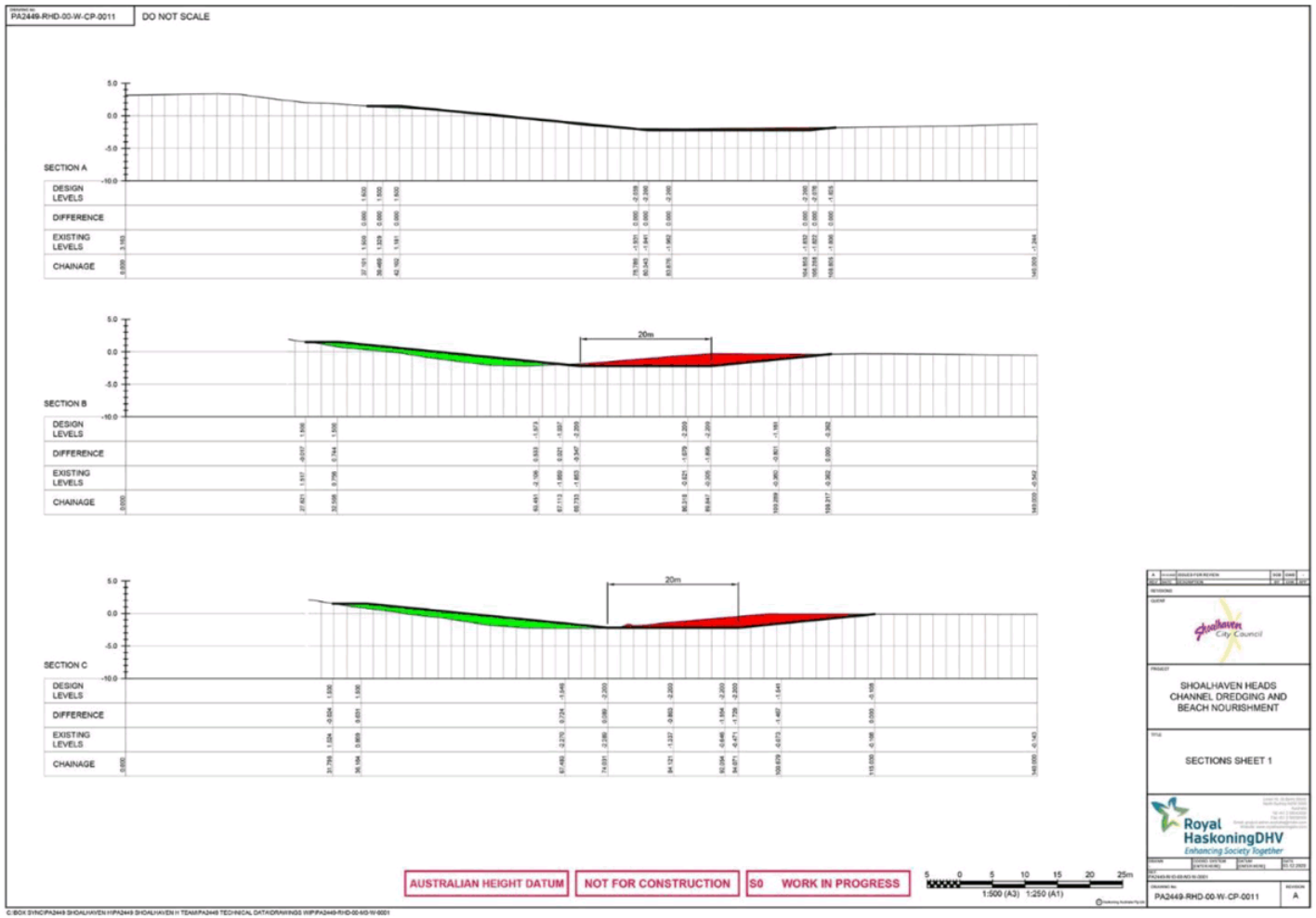

Figure 4-4: Cross-sections A, B and C through the conceptual channel dredging and beach nourishment

Project related

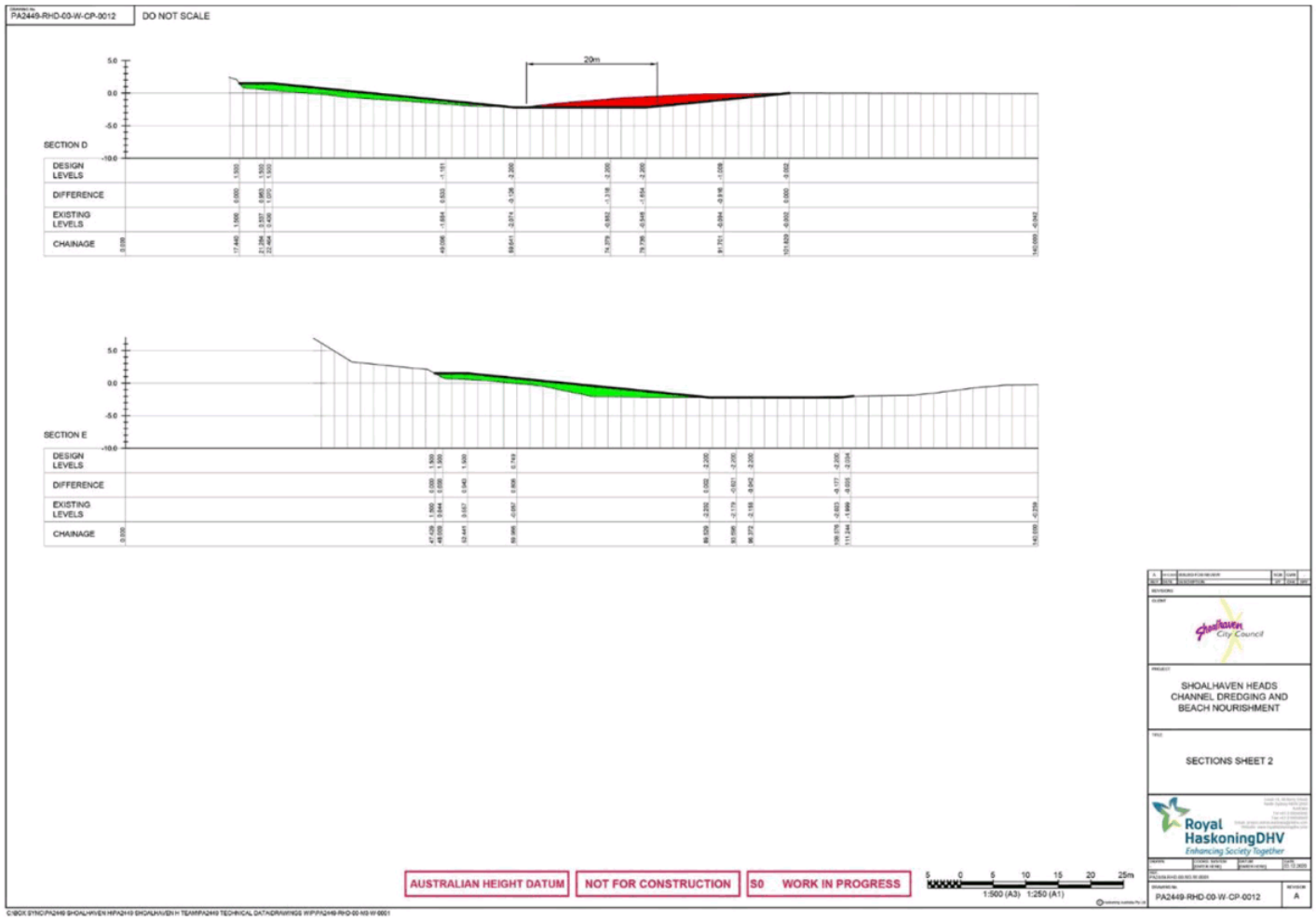

Figure 4-5: Cross-sections D and E through the conceptual channel dredging and beach nourishment

SH21.1 - Attachment 1

4.3 Methods of Channel Dredging and Beach Nourishment

There are two main methods of dredging the navigation channel for purposes of beach nourishment:

- mechanical dredging, e.g. use of an excavator mounted on a barge, referred to as a backhoe dredger (BHD); and
- hydraulic dredging, e.g. use of a cutter suction dredger (CSD) or an excavator fitted with a submersible pump and mounted on a barge.

A BHD typically removes the material with an open bucket and loads a transport barge which is then towed to the disposal location or transfer point by a work boat or tug. The barge may also be self-propelled in which case a towing vessel is not required.

The CSD or excavator/submersible pump arrangement removes the material by a cutting and suction action and pumps the dredged material as a slurry through a pipeline to the disposal or rehandling area. Water from the dredge site is mixed with the in situ material to form the slurry, which is typically 20 to 30% solids by weight. Management of the excess water in the slurry (the process of dewatering) is required at the disposal/rehandling area, within a settling pond, to ensure the dredged material achieves a moisture content suitable for beach nourishment. The excess water is returned to the waterway in a controlled manner and must satisfy agreed water quality criteria. A range of studies are undertaken to inform the design of the dredging operations, including the settling pond.

Selection of the most suitable dredging work method is a function of a range of factors including the in situ dredged material characteristics, location of dredging and disposal areas, physical site constraints and opportunities, environmental factors, and cost.

A dredging options assessment should be completed during Stage 2 of the project when additional studies have been completed, e.g. an updated hydrographic survey, detailed seagrass mapping, ecological studies, and implementation of a sediment sampling and analysis plan.

It is considered likely that the most suitable work method would involve hydraulic dredging, using either a CSD or an excavator fitted with a submersible pump and mounted on a barge, pumping to a settling pond, with trucking of the dewatered sand to the foreshore where it would be shaped by dozers/Bobcats. Based on a dredging quantity of the order of 20,000m^3 the duration of the dredging and beach nourishment project would not be expected to exceed 2 to 3 months. This includes mobilisation of plant and equipment, installation of environmental controls, creation of the settling pond dredging and nourishment activities, and demobilisation and site clean-up.

The location of the settling pond is an important consideration. It is likely that a prime candidate site for the settling pond would be adjacent to the foreshore east of the Holiday Haven Caravan Park boat ramp. Any initial sand quantity for creation of the settling pond could be potentially sourced from the dry-notch maintenance. At the completion of the works the area could be restored to enhance recreational amenity, such as creation of a sandy beach.

The final siting of the settling pond would be subject to detailed environmental impact assessment having regard to factors such as seagrass, threatened species, and foraging habitat. The approximate area which would be required for the settling pond is shown superimposed on a recent aerial photograph in Figure 4-6.

A recent example (2020) of a hydraulic dredging and beach nourishment project involving a barge mounted excavator fitted with a submersible pump, carried out at The Entrance on the NSW Central Coast, is depicted in Figure 4-7, Figure 4-8, Figure 4-9, and Figure 4-10.

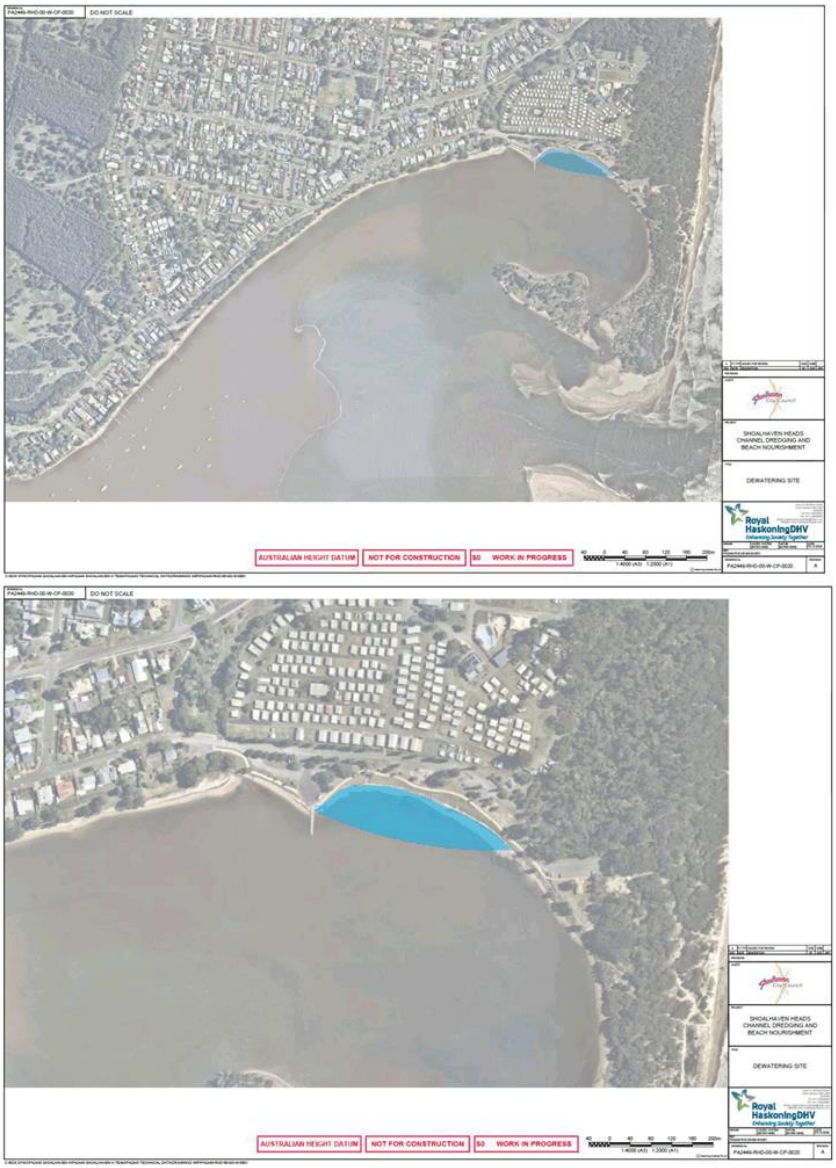

Figure 4-6: Approximate area required for a settling pond for dredging of the navigation channel (site of settling pond subject to further studies)

Figure 4-7: Aerial oblique view of The Entrance showing the dredger working in the channel and pumping to a settling pond (lower right)

Figure 4-8: View from ground level towards the dredger with settling pond in the foreground

Figure 4-9: View at the settling pond showing discharge of the slurry and management of the dredged material into a stockpile by excavator. The dewatered material was then loaded into trucks for transport to the nourishment site

Figure 4-10: View of the beach nourishment site and shaping of the nourishment sand by dozer. The beach nourishment site comprised both an estuary beach and an open coast beach

4.4 Opportunity to Value Add for Water Quality, Flooding and Ecology

Consideration should be given during further design development of the channel dredging and beach nourishment project to the opportunity to potentially 'value add' for water quality, flooding and ecological benefits.

Generally, this would involve an 'engineering with nature' approach which adopts the following principles:

- a proactive approach to planning and infrastructure that delivers benefits where possible to both recreation and the environment;
- an understanding of the environment;
- meaningful stakeholder engagement;
- preparation of proposals/design with a net environmental and social benefit.

An engineering with nature approach has already been taken in selection of the preferred navigation channel alignment (being the existing channel alignment) as this is inherently a more stable area from a natural sediment dynamics viewpoint.

In terms of water quality, it has been established in previous studies (WRL, 2015) that water quality in the Shoalhaven Heads area is presently in 'good' condition except for sporadic poor water quality events following rainfall which have since been addressed by Council (refer Section 2.3).

Shallow dredging to increase tidal circulation within the Shoalhaven Heads area was shown in WRL (2015) to be largely ineffective because of the tidal flushing dominance of Berry's Canal. Notwithstanding this finding, it is suggested consideration could be given to shallow dredging across the sand bar, connecting the waterway adjacent to the Holiday Haven Caravan Park and the main river basin, to potentially enhance local wind driven current circulation/mixing, accepting that tidal flushing will continue to be dominated by Berry's Canal.

Consideration of the above shallow dredging would be best undertaken during preparation of the Coastal Management Program (CMP) for Shoalhaven Heads, due to the range of factors involved including potential environmental impacts.

From an ecological perspective, the navigation channel dredging and beach nourishment project should seek to minimise, for example, wherever practicable and consistent with the dredging and nourishment objectives, the direct and indirect ecological impacts. Direct impact on seagrass would appear to be unavoidable. The design profile adopted for the channel dredging should aim to be conducive to colonisation by seagrass by mimicking features of the natural environment such as gentle side slopes. Consideration should be given to the feasibility of direct transplanting of seagrass, noting the existence of boat wake, local wind waves, and flooding. Any works should be scheduled to avoid the breeding season of threatened shorebirds.

From a flooding perspective, the proposed navigation channel dredging would be expected to have generally a neutral outcome on existing flooding levels (neither mitigating nor worsening) , having regard to the minor scale of the dredging compared to the scale of the natural river flooding processes. It is suggested that any consideration of a scale of dredging which would potentially benefit flooding behaviour would be best addressed as part of the CMP process and/or in detailed flood studies (which are currently underway), and kept separate from the navigation channel dredging. There is the risk otherwise that consideration of the navigation channel dredging and associated beach nourishment project would become subsumed in the larger, more complex, flooding assessment and thereby delayed.

5 PRELIMINARY ASSESSMENT OF APPROVALS PATHWAY

5.1 General

A preliminary assessment of the approvals pathway has been carried out by Royal HaskoningDHV (RHDHV) and is set out below in Section 5.2. Council also subsequently supplied a copy of advice on the approvals pathway received from the Department of Planning, Industry & Environment (DPIE) which is summarised in Section 5.3. Both sets of advice are general in nature and are not legal advice.

It is the view of both RHDHV and DPIE that due to the complexity of the circumstances of the project, particularly in relation to the navigation channel dredging, Council should obtain its own independent legal advice on the approvals pathway.

5.2 Preliminary Assessment by RHDHV

The project involves two main activities:

- dredging to achieve a navigation channel of suitable depth and width for safe navigation, between the Holiday Haven Caravan Park boat ramp and the public jetty at Jerry Bailey Road, along the alignment of the existing navigation channel; and
- nourishment of the beach adjacent to the navigation channel, using sand from dredging of the channel, to improve foreshore amenity and assist with mitigation of ongoing foreshore erosion.

It is assumed that the activities would be carried out by or on behalf of a public authority, namely Shoalhaven City Council. This is relevant to assessment of the approvals pathway.

It is convenient to consider the beach nourishment activity first.

The *Coastal Management Act 2016* (Act) at section 4(1) defines 'coastal protection works' to mean:

- beach nourishment activities or works; and
- activities or works to reduce the impacts of coastal hazards on land adjacent to tidal waters, including (but not limited to) seawalls, revetments and groynes.

State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP) at section 19(2) outlines the assessment process for 'coastal protection works' carried out by or on behalf of a public authority and states:

> *Development for the purpose of coastal protection works may be carried out on land to which this Policy applies by or on behalf of a public authority:*
>
> *(a) without development consent – if the coastal protection works are:*
> *(i) identified in the relevant certified coastal management program, or*
> *(ii) beach nourishment, or*
> *(iii) the placing of sandbags for a period of not more than 90 days, or*
> *(iv) routine maintenance works or repairs to any existing coastal protection works, or*
> *(b) with development consent – in any other case.*

Council does not yet have a certified Coastal Management Program (CMP) for the subject area. However, as the works are beach nourishment, in accordance with the above the works can be carried out without development consent. Accordingly, the approvals pathway would involve a Part 5 assessment under the *Environmental Planning & Assessment Act 1979*. This appears confirmed by the assessment flow chart included in the CM SEPP Fact Sheet 3: Coastal Protection Works prepared by the NSW Government (April 2018), reproduced in Figure 5-1.

Turning to the activity of dredging of the navigation channel, State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) at section 68(2) states:

The following development may be carried out by or on behalf of a public authority without consent on any land:

(a) development for the purposes of navigation and emergency response facilities,
(b) environmental management works associated with a port facility or a wharf or boating facility,
(c) emergency works associated with navigation and emergency response facility or a port facility.

The ISEPP at section 68(7) states:

In this clause, a reference to development for the purpose of navigation and emergency response facilities, wharf or boating facilities or associated public transport facilities for a public ferry wharf also includes a reference to dredging, or bed profile levelling, of existing navigation channels, if that dredging or levelling is:

(a) carried out for safety reasons, or
(b) carried out in connection with any such facilities that, at the time of the dredging or levelling, exist.

The proposed beach nourishment would partially infill the existing navigation channel. This would compromise the safety of the channel. It is a Council objective of the beach nourishment and channel dredging project that a safe navigation channel be provided between the Holiday Haven Caravan Park boat ramp and the public jetty at Jerry Bailey Road (refer Section 1.1).

It could be considered that dredging of the channel is to be carried out for safety reasons and thus meets ISEPP section 68(7) (a). Should this consideration be accepted, the approvals pathway for dredging would also involve a Part 5 assessment under the *Environmental Planning & Assessment Act 1979*.

In the above case, the logical approach would be to combine the Part 5 assessment for beach nourishment and the Part 5 assessment for dredging of the navigation channel into a single document. This single document under Part 5 could be either a Review of Environmental Factors (REF) or an Environmental Impact Statement (EIS), based on consideration of matters in the document 'Is an EIS required? best practice guideline' (Department of Planning, 1995). This consideration would be carried out following the additional studies in Stage 2.

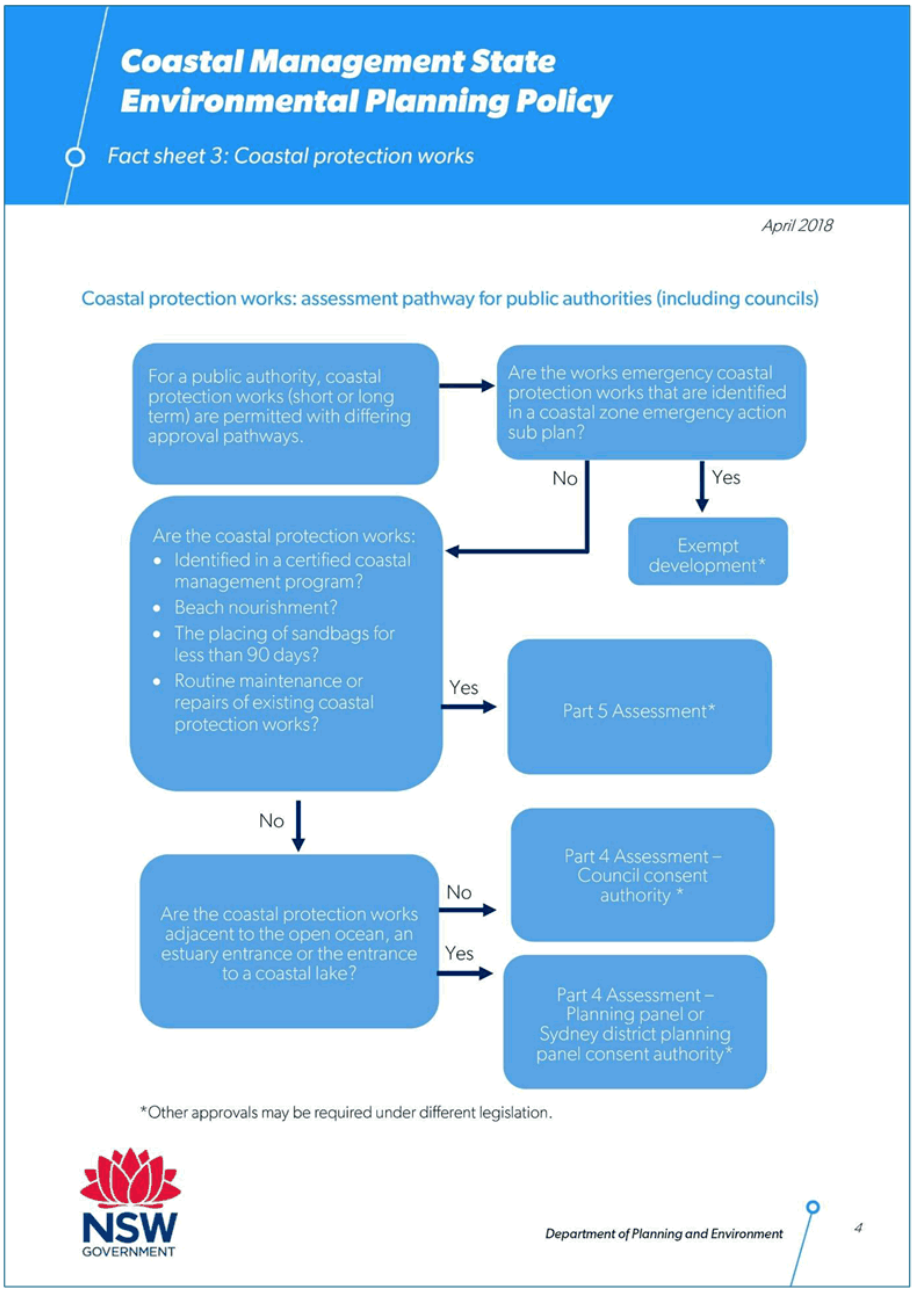

Figure 5-1: Coastal protection works: assessment pathway for public authorities (including Councils)

In addition to a Part 5 assessment under the *Environmental Planning & Assessment Act, 1979*, additional NSW legislation would need to be considered, including:

- *Coastal Management Act 2016;*
- *Fisheries Management Act 1994;*
- *Crown Lands Management Act 2016;*
- *Biodiversity Conservation Act 2016;* and
- *Protection of the Environment Operations Act 1997.*

In relation to the *Protection of the Environment Operations Act 1997* (POEO Act), it is noteworthy that recent amendments have been made (2019) to Schedule 1 to the POEO Act in relation to 'extractive activities', which includes dredging. The scope of 'extractive industries' has been altered so that there is no longer a distinction between land-based and water-based extraction. It also limits the scope so as to relate only to extraction and processing of material for the primary purpose of selling material. It is not proposed to sell the (extractive) material from dredging of the navigation channels at Shoalhaven Heads.

On the basis of the above, it would appear that dredging of sand from the navigation channel and its use as beach nourishment material would not require an Environment Protection Licence (EPL). This should be confirmed with the Environment Protection Authority. In the event an EPL is not required, consideration should still be given to obtaining an EPL for the non-scheduled dredging activity as compliance with the conditions of the licence provides a defence to the offence of polluting waters under section 120 of the POEO Act.

In addition to consideration of NSW legislation, following completion of the additional studies in Stage 2, consideration should also be given to the possible application of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

5.3 Summary of Advice from DPIE

The DPIE advice was based on review of the draft RHDHV report and internal briefing, and was set out in the form of responses to three questions. These three questions and a summary of the advice in relation to them are set out below, together with a response by RHDHV where considered appropriate:

- Are the proposed works able to be carried out under the provisions of the Infrastructure SEPP 2007 (clause 68)?
  - it is agreed the proposed works are unlikely to fall within the definition of environmental management works,
  - while it is possible the works fall within the definition of 'navigation and emergency response facilities' or 'wharf or boating facilities', as the works relate to an existing navigation channel and the public jetty at Jerry Bailey Road, this characterisation is quite problematic,
  - as the modification of the existing channel would not be necessary but for the fact Council proposes to nourish the adjacent beach, which will narrow it in the first place ..... it is unlikely that Council will be able to characterise the works as development for the purpose of navigation and emergency response facilities or wharf or boating facilities or rely on clause 68(7) in this instance.

RHDHV response:

Project related

There was no reliance sought to characterise the works as 'environmental protection works', 'emergency response facilities' or 'wharf or boating facilities', but rather works for the purpose of navigation, carried out for safety reasons.

- Are the proposed works able to be undertaken as development without consent via an alternative approval pathway?
  - Council may be able to characterise both the dredging works and beach nourishment works as development for the purpose of 'coastal protection works' as defined under the *Coastal Management Act 2016*,
  - the development, therefore, may be able to be carried out without development consent under clause 19(2)(a) of the Coastal Management SEPP.

- Is there anything else Council should consider?
  - the RHDHV report does not provide enough detail to establish the appropriate approval pathway for the proposal,
  - it is recommended an update also consider in detail potential impacts such as impact on seagrasses located in the area, whether the dredging would change the types of vessels that could navigate in that section of the waterway, or make it navigable when it wasn't before.

RHDHV response:
DPIE do not specify what additional detail is required in relation to the project proposal. The objectives of the proposal, as stated by Council, include beach nourishment and provision of a channel of suitable depth and width for safe navigation, as noted in Section 1.1 of the report.

The scope of work for Stage 1 of the study did not include a detailed environmental impact assessment, including impact on seagrasses. This is a Stage 2 activity, as outlined in Section 1.2 of the report.

There is no intention to necessarily change the types of vessels that could navigate in the channel. The approach taken for assessment of channel dredging for concept purposes was to provide, conservatively, a channel that was safe for navigation for vessels that could be launched at the public boat ramp at the Holiday Haven Caravan Park, having regard to the NSW Boat Ramp Facility Guidelines (RMS, 2015) and Australian Standard AS3962:2020. This is explained in Section 3.3 of the report.

6 RECOMMENDATIONS FOR ADDITIONAL STUDIES IN STAGE 2

A number of studies are recommended for completion in Stage 2 of the project. These are listed in Table 6-1 together with a budget estimate of cost. Council has advised that a number of activities would be undertaken by Technical Services within Shoalhaven City Council and that it is not necessary to provide budget cost estimates for these activities.

The hydrographic survey and land survey, and the preparation and implementation of a SAP, are fundamental inputs to the engineering studies and should be commenced at the outset of Stage 2. The findings of the terrestrial and aquatic flora and fauna studies would also inform the engineering studies as these findings may influence design of the channel dredging and beach nourishment, work methods, timing of the works, and the like. As such, the flora and fauna studies should also be commenced at the outset of Stage 2.

Table 6-1 Additional studies for Stage 2 and budget cost estimates

Study/activity	Budget cost estimate (excl GST)
Hydrographic survey and land survey (see Note 1)	$30,000
Preparation and implementation of a sampling and analysis plan (SAP) (see Note 2)	$35,000
Engineering studies including design and drawings sufficient for input to a REF (or EIS), preparation of cost estimates, and to support applications for necessary approvals (excludes detailed design and documentation) (see Note 3)	$50,000-$120,000
Terrestrial and aquatic flora and fauna studies	N/A (see Note 4)
Preparation of REF (or EIS), including consultation, and submissions for approvals	N/A (see Note 4)

Notes:

1. Extent of hydrosurvey limited generally to the existing navigation channel and adjacent sand bank extending from the eastern limit of the Holiday Haven Caravan Park area to the public jetty at Jerry Bailey Road.
2. Includes a piston coring or vibrocoring sampling program in the proposed dredging area and laboratory testing for particle size grading, geochemistry and acid sulfate soils. Testing could also include settling tests to inform settling pond requirements and water quality control measures, and to establish relationships between Total Suspended Solids (TSS) and turbidity (NTU) for subsequent water quality monitoring purposes.
3. A range of costs is provided for the engineering studies as the extent of modelling in particular is uncertain without further detailed consultation with Agencies and since certain costs may be included under other projects such as the current flood study. It is noted that an estimate of $100,000 was included in the Minutes of the meeting of the Shoalhaven Heads Estuary Taskforce held on 20 March 2017, for 'investigations, costings and design options for selection of navigation channel for dredging and sand nourishment of northern shoreline of river'.
4. N/A = Not Applicable. Assumed to be undertaken by Technical Services, Shoalhaven City Council (or possibly by external consultant). Refer also to Minutes of the meeting of the Shoalhaven Heads Estuary Taskforce, held on 20 March 2017.

Figure 6-1: View of split sediment core on the sampling vessel, allowing visual examination of the material to be dredged, logging, photography and subsampling for laboratory testing

7 REFERENCES

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