

MANAGING COASTAL HAZARDS THROUGH BENEFICIAL REUSE OF DREDGED SAND AND AN ADAPTIVE WORKS STRATEGY

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Introduction

Shoalhaven City Council (SCC) developed a strategy to deal with increased demand from the community for improving navigation, boating safety and waterway entrance management at a number of estuarine locations within the Shoalhaven Local Government area. This strategy was documented in the Shoalhaven City Wide Dredging Feasibility Study that was prepared in consultation with nominated community members of Council's Natural Resources and Floodplain Management Committees. Dredging proposals at Currambene Creek, Lake Conjola and Sussex Inlet were prepared in collaboration with Royal HaskoningDHV (RHDHV) that maximise the beneficial reuse of sand in areas identified at high risk of coastal erosion. These projects received funding from the NSW State Government through the Rescuing our Waterways Program. The environmental assessment, design and procurement of a dredging contractor has been completed with the works proposed in the first half of 2016. However, as result of the August 2015 floods, amendments to the projects are being considered.

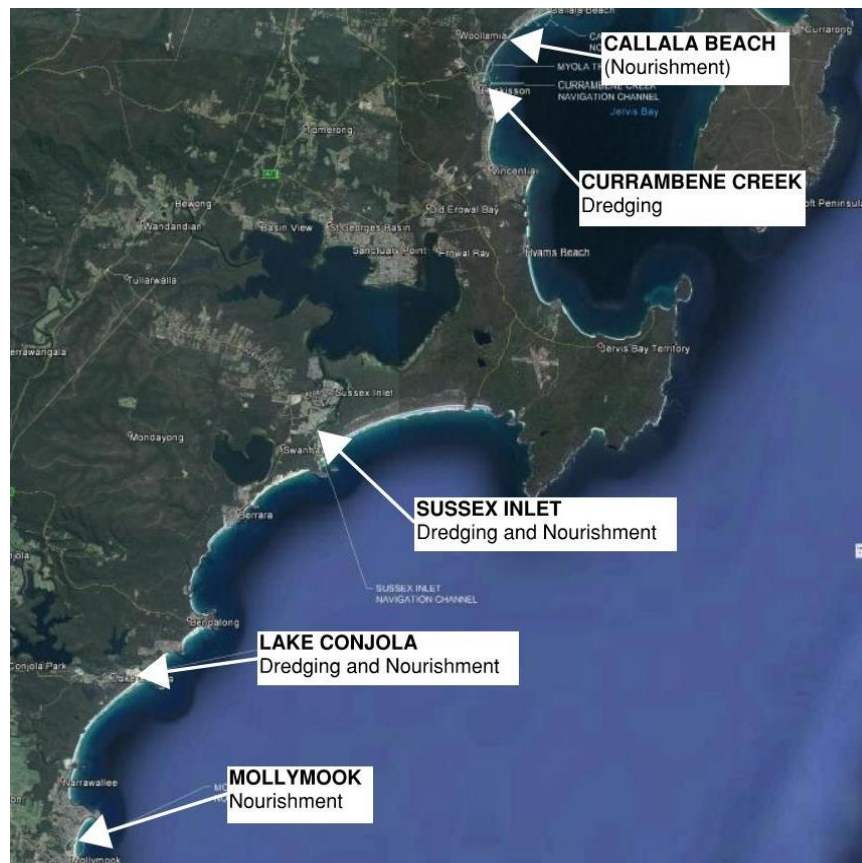


Figure 1: Location of the dredging and nourishment projects

Dredging Projects and Beneficial Reuse of Dredged Sand

The three separate dredging projects all involve the removal of clean sand suitable for beneficial reuse as foreshore and beach nourishment. Four beach and foreshore areas were considered feasible for nourishment activities to assist with managing coastal hazards, two of which are “authorised location” beaches; namely at Mollymook, and Callala Beach.

The Lake Conjola dredging aims to improve navigation to reconnect the boat ramp at Cunjurong Point to the main body of the lake, better separate boat users from swimmers, and facilitate future entrance openings (but does not involve deepening or widening the entrance). Up to 12,000 m³ of clean sand is to be dredged and beneficially reused to address foreshore erosion on the southern foreshore at Lake Conjola, with a portion transported to Mollymook Beach for nourishment.

The Currumbene Creek dredging aims to improve navigation access to the creek entrance and wharves. This involves dredging up to 3,000 m³ of clean sand and up to 400 m³ of rock. The rock would be beneficially reused to maintain and improve a rock training wall in the creek, and the sand would be placed on Callala Beach for nourishment.

The Sussex Inlet dredging project aims to improve safety and navigation in the channel, particularly for marine rescue. This involved dredging between 4,000 m³ to 8,000 m³ of clean sand linking deeper areas of the navigation channel. Dredged sand is proposed to be beneficially reused to address foreshore erosion through nourishment and construction of sand filled geotextile container groynes.

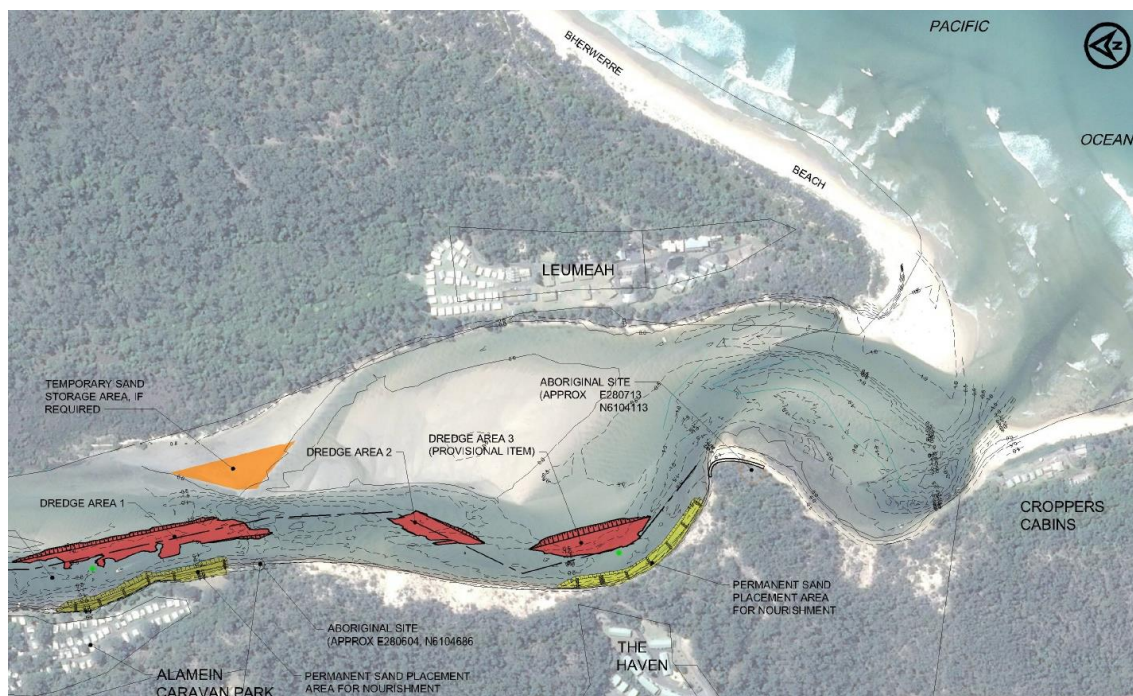


Figure 2: Proposed Dredging and Nourishment Works at Sussex Inlet

Beneficial Reuse of Dredged Sand

Adaptive Works Strategy for Coastal Management

SCC has developed a draft Coastal Zone Management Plan covering all 39 beaches in its Local Government Area. Draft Coastal Emergency Action Sub-plans have also been prepared for the high risk beaches. In the event of storms, a range of “make-safe/make-good” provisions are already in place. These can be introduced at all of the 39 beaches.

Council had previously developed conceptual designs for “end-state” protection of property at its “authorised location” beaches however, these are costly to implement and are presently unaffordable. Therefore, an adaptive works strategy was developed for moving from “make-safe/make-good” to “end state” protection. Due to suitable sand becoming available as a result of the dredging works, components of the adaptive works strategy are being implemented.

At Mollymook Beach, a staged approach has been adopted as an adaptive strategy. Stage 1 which consists of a training wall at Blackwater Creek associated with dune nourishment (using dredged sand from Conjola Lake) to protect the sewer pump station and the 11 southern-most shorefront private properties will soon be implemented. The training wall has been designed so that it can be later extended into a revetment wall protecting 29 shorefront private properties thereby delivering Stage 2 and the end- state design.

Challenges

Currambene Creek is located in a marine park where careful consideration of environmental impacts were required. The initial dredging footprint was revised in order to avoid the Sanctuary Zone. A significantly more elaborate and expensive procedure to deliver sand to Callala Beach was developed to avoid/minimise impacts on shorebirds, seagrass, and beach users. A carefully designed water quality monitoring plan was also developed and licensed by NSW EPA.

At Conjola Lake and Currambene Creek the issue of migratory protected shorebirds was important. The works at Conjola have been programmed so that it does not interfere with the shorebird nesting season. At Currambene Creek the sand transport route was amended so that it does not impact on the shorebird breeding sites.

At Sussex Inlet, important seagrass communities could potentially be affected by the dredging and foreshore nourishment works. A detailed survey and control site have been established so that the impact can be quantified over a two year period. Should a loss of seagrass occur, compensatory measures will be implemented.

At Lake Conjola, the initial temporary sand stockpile for transport to Mollymook Beach was located north of the lake where saltmarsh and Aboriginal artefacts could have been potentially impacted. Concerns from residents of a village located north of the lake about traffic safety and impacts on road networks were also raised. In order to minimise these impacts, the temporary sand stockpile location was relocated south of the lake.

Budget

The three dredging projects are 50% funded under the State Government's Rescuing our Waterways program.

Council initially thought that it could also recoup some cost by selling some of the sand, however, this option was not supported by State Government Agencies and in particular the Office of Environment and Heritage. An EOI process was conducted inviting the industry to price purchasing the sand from Council. The outcome was that reusing the sand on Crown Land to manage erosion would provide a much better return to Council. In addition, selling some of the sand would have also triggered a lengthier (outside of the grant funding agreement timeframe) and more expensive assessment and approval process as the proposal would have been seen as a sand mining activity.

Consultation

Consultation with both the Community and Government Agencies was critical in developing successful strategies for beneficial reuse of the dredged material.

Each community was openly consulted at three public consultation sessions involving the Mayor, Councillors, Council Officers, and facilitated by RHDHV. The community has been largely divided on the proposed dredging. Community members opposed to the projects are mainly concerned about the environmental impacts (short and long term), and efficient use of public money due to the high lifecycle cost of dredging compared to other Council managed assets. Community members supportive of the projects see the navigational and safety improvements and potential economic return through increased tourism as major benefits. The draft Review of Environmental Factors (REF) was also placed on Public Exhibition for public comments to further engage with the community.

Government Agencies were also consulted through two meetings to present the proposed projects and REF for comment, and to demonstrate how comments had been incorporated. Government Agencies included: NSW Crown Lands, Department of Primary Industries (DPI Fisheries), Office of Environment & Heritage, Roads and Maritime Services, NSW Environment Protection Authority, Jervis Bay Marine Park, NSW National Parks and Wildlife Service, and NSW Coastal Panel..

Additional consultations sessions with both the community and Government Agencies were held with the required parties to address specific issues.

Monitoring

Monitoring of dredged and nourishment areas has been recognised as a fundamental component of the works.

Monitoring of dredge areas would involve undertaking hydrographic surveys of the dredge areas immediately prior to and following the completion of the dredging works. Ongoing survey of these areas are recommended to assess the sustainability of the dredging and better understand the sediment transport behaviour at the sites. It is planned that these surveys are carried out at least bi-annually in the first year, and annually for the following 4 years or until a sufficient understanding of the interaction between sediment dynamics and the proposed dredging has been established.

Monitoring of both the placement and subsequent re-working of the material placed in the nourishment areas is recommended to further understand of the behaviour of the nourishment material. This information would be used to help refine future erosion and coastal hazard protection works. It is likely that this monitoring program would consist of the following activities:

- Surveys - Surveys of the nourishment area and surrounds would be undertaken both immediately prior to and immediately after placement. Ongoing Survey of the area is recommended with changes to the nourishment profile analysed. It is recommended these surveys are carried out annually for 3 years or until a sufficient understanding of the behaviour of the nourished area has been established.
- Photography and Reporting - Photographs of the nourishment area would be taken and observations recorded.

Implications of the August 2015 Flood

Over a 48 hour period spanning across 24 to 26 August 2015, around 390 mm of rainfall was recorded by the Bureau of Meteorology at the Nowra weather station. This rainfall event corresponds to between a 20 and 50 year Average Recurrence Interval event. Large freshwater flows were experienced at all three dredging sites that resulted in localised scouring and accretion of the bed, thus effectively altering the pre-dredge survey condition and potentially the design dredging requirements. Hydrographic surveys were carried out by Council at the three dredging sites in the first half of September 2015 to capture the impact of the freshwater flow on the bed.

Comparison of the pre and post flood hydrographic surveys were undertaken which presented the following implications for the proposed dredging projects:

- Currumbene Creek - no sand dredging required and therefore nourishment of Callala Beach would require another sand source, or be nourished as part of potential future dredging projects. Rock dredging still proposed.
- Lake Conjola – dredging and associated nourishment to be carried out as per the design.

- Sussex Inlet - resurvey in three months (December 2015) for further assessment and revisit dredging design.

Ongoing survey of all of these areas is anticipated to better understand the sediment processes. Gathering of this survey information would prove to be valuable for evaluating the sustainability of future dredging projects.

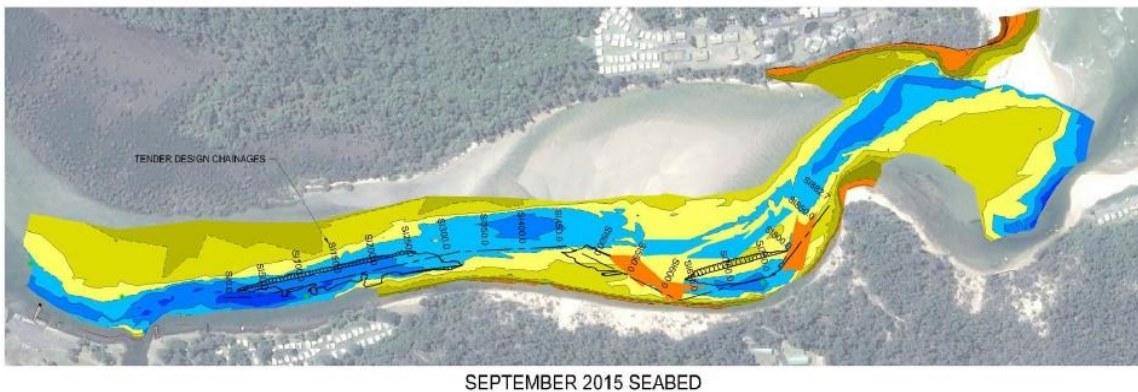


Figure 3: Pre and Post flood survey comparison at Sussex Inlet. Blue areas indicate design navigation depth.

Conclusion

Shoalhaven City Council has integrated its dredging and coastal programs to maximise the benefits for its community. The consideration of social and environmental criteria required amendments to the original scope to limit the project's impacts. Council is committed to undertake monitoring in order to develop a greater understanding of the sustainability and life cycle cost of dredging and beach nourishment in the Shoalhaven local government area.

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