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Maroochydore Beach Nourishment Project Evaluation

August 2016

Sunshine Coast Council

Document Control Sheet

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Executive Summary

Prior to the Maroochydore Beach Nourishment Project (the Project) the beach was in a severely eroded state with vast areas of exposed coffee rock and the dune/foreshore buffer reduced to approximately 20 m at some locations (measured landward from the toe of the frontal dune). At this time the Maroochydore Beach shoreline values and the adjacent assets that rely on protection offered by a sand dune system were vulnerable to subsequent erosion events.

The Project involved the replenishment of Maroochydore Beach using sand extracted from the lower Maroochy River. The works were completed over a three year period (in distinct stages) during which time a total of 220,000 m^3 of sand was relocated to the upper beach.

Two of the more severe weather events to occur during the Project were related to East Coast Low (ECL) pressure systems that impacted in the Sunshine Coast Region during May 2015 and June 2016. These weather systems generated high energy seas and caused significant coastal erosion along the east coast of Australia. However, on both occasions the more severe impacts occurred to the south of the Sunshine Coast region. The local surge and wave conditions during these events did not exceed the 20-year Average Recurrence Interval (ARI) levels. The prevailing coastal processes during the Project were considered representative of the long term average, non-extreme conditions.

Monitoring of the beach condition during the Project shows rapid fluctuations in the volume of sand stored above the low water mark. A post storm survey following the June 2016 ECL event suggests 40,000 m^3 was removed from the upper beach over a short period (days). Natural accretion events of a similar magnitude were also recorded during the Project; however, these occurred over longer periods (months).

The net northerly littoral drift transported sand out of the Maroochydore Beach compartment at an estimated rate of 35,000 m^3/year during the Project. A much smaller volume (<4,000 m^3/year) was estimated to enter the southern extent of the beach compartment. The average annual deficit of sand was therefore approximately 30,000 m^3. Interestingly, this estimate was found to be reasonably consistent with the annual loss of nourishment sand from the upper beach over a 12 month period based on beach survey data (estimated between 37,000 m^3 and 24,000 m^3).

Considering the longshore sediment transport estimates, the loss of sand from the Maroochydore Beach compartment during the Project period was estimated to be 100,000 m^3. Along the 1.7 km stretch of shoreline, this sand deficit corresponds to an average setback of approximately 15 m (assuming erodible material at the shoreline). This suggests that Maroochydore Beach would be in a poor condition with low value in the absence of the sand replenishment campaign.

Considering the total volume of sand that was placed on the beach during the Project (220,000 m^3) and the estimated deficit of 100,000 m^3 over this period, more than half the nourishment material remains in the beach system. This suggests an overall net benefit to the beach system; however, it should be considered that the region did not experience a significant design storm event during the Project. Feasibility assessments prior to the Project estimated a design erosion volume between 200,000 m^3 and 260,000 m^3. This suggests that the beach, its values, and adjacent assets, are still vulnerable to coastal erosion events despite the success of the Project. This highlights the need for an ongoing nourishment program in perpetuity.

Contents

Executive Summary **i**
1 Introduction **1**
1.1 Report Context 1
1.2 Project Setting 1
1.3 Project History 2
2 Pre-project Conditions **6**
2.1 Maroochydore Beach 6
2.1.1 Shoreline and Asset Vulnerability 7
2.2 Maroochy River Sand Source 10
3 Summary of Works **12**
3.1 Pipeline Installation 12
3.2 Stage 1 Dredging and Nourishment 12
3.3 Stage 2 Dredging and Nourishment 12
3.4 Stage 3 Dredging and Nourishment 12
4 Coastal Processes during the Project **17**
4.1 Introduction 17
4.2 Storm History 17
4.3 Tides and Surge 18
4.4 Waves 21
4.5 Sediment Transport Potential 24
4.5.1 Longshore Sand Transport 24
4.5.2 Cross-Shore Sand Transport 26
5 Monitoring **28**
5.1 Introduction 28
5.2 Lower Maroochy Sand Source 28
5.2.1 Stage 1 28
5.2.2 Stage 2 30
5.3 Maroochydore Beach 32
5.3.1 Stage 1 32
5.3.2 Stage 2 36
5.4 Project Evaluation 37
6 Ongoing Program Considerations **38**
6.1 Introduction 38

6.2 Maroochydore Beach Nourishment Project Approvals Framework 38
6.3 Ongoing Program Approvals Options 40
6.3.1 Local Government Permits 40
6.3.2 State Government Permits 40
6.3.3 Referral Decision 40
6.3.4 Proposed Approvals Strategy 41
7 References 43

List of Figures

Figure 1-1 Maroochydore Beach Nourishment Project Site Context 3
Figure 2-1 Maroochydore Beach Offshore Bathymetry and Exposed Coffee Rock Pre-nourishment 8
Figure 2-2 Exposed Coffee Rock Looking South (top) and North (bottom) from the Okinja Road Beach Access (photos courtesy of SCC) 9
Figure 2-3 Lower Maroochy River Bathymetry and Sand Investigation Areas 11
Figure 3-1 Slurry Pipeline Alignment and Disturbance Areas 13
Figure 3-2 Stage 1 Dredging and Nourishment (clockwise from top left): Birdon Pty Ltd CSD Dogo in the Lower Maroochy River; Sand Delivery to Maroochydore Beach; Beach Condition after Nourishment Works; Beach Condition before Nourishment Works 14
Figure 3-3 Stage 2 Dredging and Nourishment (clockwise from top left): Pre-works Beach Condition North; Pre-works Beach Condition South; Pipeline Sand Delivery to Maroochydore Beach; Neumann CSD *Nu Endeavour* in the Lower Maroochy River 15
Figure 3-4 Stage 3 Dredging and Nourishment (clockwise from top left): Restricted Pedestrian Access at North Shore Spit; Sand Delivery to Maroochydore Beach; 'The Aussies' at Maroochydore Beach, April 2016 16
Figure 4-1 May 2015 East Coast Low – Mean Sea Level Pressure and Precipitation 17
Figure 4-2 June 2016 East Coast Low – Mean Sea Level Pressure and Precipitation 18
Figure 4-3 Recorded Water Level and Residual at Mooloolaba Tide Gauge during the Project (data provided by DSITI) 20
Figure 4-4 Recordings at the Mooloolaba Tide Gauge during the April/May 2015 ECL (data provided by DSITI) 20
Figure 4-5 Recordings at the Mooloolaba Tide Gauge and Wave Buoy during the June 2016 ECL (data provided by SCC and DSITI) 21
Figure 4-6 Wave Rose at Mooloolaba Wave Buoy during the Project (data provided by DSITI) 23
Figure 4-7 Recordings at Mooloolaba Wave Buoy during the Project (data provided by DSITI) 23

Figure 4-8	Recordings at the Mooloolaba Wave Buoy during the April/May 2015 ECL (data provided by DSITI)	24
Figure 4-9	Cumulative Volume of Longshore Sediment Transport	26
Figure 5-1	Stage 1 Post Works Sand Extraction Survey October 2013	29
Figure 5-2	Infilling of the Permitted Dredge Footprint between October 2013 and April 2015	31
Figure 5-3	Beach profile survey approximately 2 months after Stage 1 sand nourishment works	34
Figure 5-4	Beach profile survey approximately 12 months after Stage 1 sand nourishment works	35

List of Tables

Table 1-1	Maroochydore Beach Nourishment Project Key Milestones	4
Table 4-1	Mooloolaba Standard Port Tidal Planes (Maritime Safety Queensland, 2016)	19
Table 4-2	Design Surge plus Tide Levels at Maroochydore Beach (Aurecon, 2013)	19
Table 4-3	Design Significant Wave Heights at Maroochydore Beach (BMT WBM, 2013)	22
Table 4-4	Estimates of Cross-Shore Transport Dominant Condition	27
Table 5-1	Stage 1 Upper Beach Monitoring (Definium, pers. comm. 2014)	33
Table 5-2	Stage 2 Upper Beach Monitoring (Definium, pers. comm. 2016)	37
Table 6-1	Approvals for Maroochy River dredging and associated placement	39

1 Introduction

1.1 Report Context

The works associated with the Maroochydore Beach Nourishment Project (the Project) involved dredging sand from the lower Maroochy River and placing the material at Maroochydore Beach. The works were completed in three distinct stages and included the following approximate sand volumes:

(1) May to September 2013 – 125,000 m^3

(2) June to July 2015 – 75,000 m^3

(3) February to March 2016 – 20,000 m^3

Chapters 1, 2 and 3 of this report provide background information to the Project and a summary of the works.

In Chapter 4, consideration is given to the coastal processes experienced during the Project period, particularly with regard to sediment transport potential. This information provides a basis for understanding the consequences of not undertaking the Project (i.e. a 'do nothing' approach for coastal erosion management).

Chapter 5 summarises the data that was collected specifically for the Project to support planning studies and in accordance with environmental permit conditions, including:

- Bathymetric survey and sediment sampling at the target dredge area to confirm the available volume and quality of sand;
- Upper beach surveys to establish the pre- and post-nourishment profile; and
- Upper beach surveys to at two monthly intervals to monitor the beach profile changes.

These and other existing datasets that describe the prevailing conditions during the Project are collated, analysed and used to evaluate the benefit of the works. This is summarised in Section 5.4.

Finally, the existing environmental permits associated with the project have been reviewed and considered in the context of the current legislative framework. An approvals strategy to allow ongoing access to this sand source is provided in Chapter 6.

1.2 Project Setting

This report concerns a 1.7 km stretch of shoreline between the Alexandra Headland Surf Lifesaving Club and the Maroochy Surf Club, Sunshine Coast, Queensland (referred to herein as 'Maroochydore Beach'). The shoreline is characterised as a sandy beach with a relatively narrow dune and foreshore buffer that includes dune scrub vegetation and casuarinas. Maroochydore Beach is an iconic Sunshine Coast destination and carries significant social and economic value. The location and associated assets are shown in Figure 1-1.

Exposed coffee rock is often visible in the nearshore area which is understood to be indicative of a receding shoreline on a geological timescale (e.g. Jones, 1992 and Willmott, 2007). Storm events during the 2009 to 2013 period caused the beach to lower and much of the dune buffer had eroded.

When the shoreline is in an eroded state the social and recreational values of the area are compromised and the land-based assets have little protection from subsequent storm events. The threat to infrastructure, in particular Alexandra Parade, is greatest within the southern section of the study area. The threat is relatively lower to the north of the Maroochydore Beach Holiday Park due to a wider dune and vegetation buffer.

Beach nourishment was identified as a preferred interim coastal erosion management option for Maroochydore Beach. The primary intent of beach nourishment is to maintain and enhance a buffer between coastal processes and land based assets thereby delaying the need for a hard engineered structure. A secondary benefit is the improvement to beach amenity. Ideally, the erosion management technique involves the importation of sand to the beach from outside the active beach system. This effectively replaces the loss of sand from the system and/or the deficit in supply of sand that is causing the erosion. Sand placed on the beach is typically used to enhance the upper beach and/or construct a new dune (which is often subsequently vegetated to stabilise the sand).

A key constraint for beach nourishment projects is often associated with access to a suitable sand source. Feasibility studies to explore sand source options for Maroochydore Beach commenced in 2011. Council has since extended this investigation through the Sunshine Coast Regional Sand Sourcing Study (BMT WBM, 2015).

1.3 Project History

Key milestones throughout the Project are summarised in Table 1-1 and discussed in further detail throughout this report.

LEGEND

- Permitted Sand Extraction Area 2012 (permitted area amended in 2015)
- Fish Habitat Area (DAFF)
- Indicative Pipeline Route

Title:
Maroochydore Beach Nourishment Project Site Context

Figure: **1-1**

Rev: **A**

BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

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Table 1-1 Maroochydore Beach Nourishment Project Key Milestones

Date	Project Milestone
November 2011 Feasibility Studies Commence	Feasibility studies to support the Project commence, including: • Justification for the project • Operational considerations • Description of the existing environment • An environmental impact assessment • Summary of the legislative framework and permitting requirements The feasibility study identified the lower Maroochy River as a potential sand source (at locations clear of the declared Fish Habitat Area). It was proposed that the sand would be dredged from the lower river by a small Cutter Suction Dredge (CSD) with the sand delivered to Maroochydore Beach via a slurry pipeline.
August 2012 EPBC Referral Decision	The Project was referred to the (then) Federal Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) due to the potential for impact to matters of national environmental significance, namely: • Listed threatened species and ecological communities (50 species potentially occurring within the project area) • Listed migratory species (57 species potentially occurring within the project area; 3 species known to occur in the project area) A referral decision under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was received from DSEWPaC on 20 August 2012. The notice indicated that the proposed project was not a controlled action provided the dredging and nourishment works were only undertaken between the months of May and September (outside of migratory shorebird roosting periods) and that no loss of shorebird habitat occurs.
November 2012 Concurrence Agency Response	A development application for the works under the *Sustainable Planning Act 2009* was lodged during October 2012. A concurrence agency response from the State Department of Environment and Heritage Projection (DEHP) was received on 2 November 2012 providing permits for: • Dredging within the lower Maroochy River (Environmentally Relevant Activity 16 threshold 1(c) dredging) • Beach nourishment for coastal erosion management purposes (Prescribed Tidal Works)
February 2013	On 4 February 2013, SCC issued a development permit for Operational Works (Prescribed Tidal Works –

Date	Project Milestone
SCC Development Permit	Dredging and Beach Nourishment). Under the regulatory approvals associated with the project SCC was permitted to relocate up to 350,000m^3 of sand over a four year period subject to the availability of sand within the approved dredge footprint.
April 2013 Pipeline construction	Sand delivery pipeline extending from Cotton Tree to the Alexandra Headland skate park was installed. The semi-permanent infrastructure included a number of 'offtake' locations so that sand can be distributed at a number of different locations along the pipeline length.
September 2013 Stage 1 works completed	Stage 1 works were completed by Birdon Pty Ltd between May and September 2013 and involved relocation of approximately 125,000 m^3 of sand from the permitted area within the lower Maroochy River to Maroochydore Beach. The sand was relocated via a CSD and slurry pipeline and redistributed at the beach by standard earthworks equipment.
July 2015 Stage 2 Works completed	Stage 2 works were completed by Neumann Contractors Pty Ltd between June and July 2015 and involved relocation of approximately 75,000 m^3 of sand. Prior to dredging an amendment to the dredge footprint in order to avoid undesirable silt material was approved by DEHP and SCC.
March 2016 Stage 3 Works completed	The third and final nourishment campaign was undertaken by Neumann Contractors Pty Ltd during February and March 2016. This 'top up' campaign relocated approximately 20,000 m^3 of sand in order to provide a resilient and safe beach for the Australian Surf Lifesaving Championships ('The Aussies') held between 16 and 24 April 2016. Prior to dredging an amendment to the EPBC referral and DEHP permit conditions to allow dredging during the months of February and March was approved. The amendment required an area at North Shore to be closed to the public to provide undisturbed habitat for migratory shorebirds.

2 Pre-project Conditions

2.1 Maroochydore Beach

Maroochydore Beach is morphologically dynamic and fluctuations in shoreline position are the result of the prevailing coastal processes.

The wave climate at Maroochydore Beach is a combination of ocean swell and locally wind-generated 'seas'. The swell waves are of long period (typically 7-12 seconds) and propagate to the shoreline from the deep ocean. Waves experience significant modification by refraction, bed friction and shoaling. Wind generated sea waves are of relatively very short period (generally less than 4 seconds) and are not substantially affected by the offshore bathymetry prior to breaking nearshore.

The waves have four key effects on sand transport, namely:

- Waves break and generate so-called radiation stresses, particularly within the wave breaker zone where wave-driven longshore currents may result.
- The wave orbital motion impacts on the seabed causing bed shear stresses that mobilise and put into suspension the seabed sand.
- Wave asymmetry in shallower water causes a significant differential in the forcing on the bed sediments, stronger towards the shoreline in the forward direction of wave travel leading to an onshore mass transport of sand.
- Waves cause a bottom return current in the surf zone, strongest during storms when they typically dominate over the mass transport and move sand offshore.

Currents provide the primary mechanism for the transport of the sand that has been mobilised and put into suspension by the wave/current action. The currents also impose a bed shear stress that may mobilise the seabed sand. The total bed shear stress results from a complex, non-linear interaction between waves and currents. During prevailing, non-storm conditions the longshore current generated by waves breaking at an angle to the shoreline is the dominant sediment transport mechanism at Maroochydore Beach. The longshore sand transport is distributed across the surf zone and typically peaks near the wave break point where the wave height, longshore current and bed shear are greatest.

Where there are differentials in the rates of longshore transport (that is, the difference in the volume of material transported into and out of the beach unit) the beach will erode or accrete in response. However, because longshore and cross-shore transport coexist, progressive net sand losses due to a longshore transport differential may not manifest as erosion of the upper beach until storm (cross shore) erosion occurs, and less sand is subsequently returned to the beach/dune than was previously there.

Historically the sandy beach between the Alexandra Headland and Maroochy Surf Clubs has been observed to naturally erode and accrete in response to the prevailing coastal processes. Prior to Stage 1 of the Project the beach was in an eroded state with vast areas of exposed coffee rock and the dune/foreshore buffer reduced to approximately 20 m at some locations (measured landward from the toe of the frontal dune). At this time the Maroochydore Beach shoreline values and the adjacent assets that rely on protection offered by a sand dune system were vulnerable to subsequent erosion events. The area of exposed coffee rock was mapped in 2011 and is shown in Figure 2-1. Photos of the severely eroded beach condition are shown in Figure 2-2.

2.1.1 Shoreline and Asset Vulnerability

Beaches in a severely eroded condition have poor social and recreational value and a reduced capacity to dissipate wave energy, therefore providing little storm protection to adjacent assets.

Feasibility studies to support the Project estimated a shoreline setback between 24 and 62 metres associated with design storm event (BMT WBM, 2012). The shoreline setback distance was predicted to vary along the beach depending on the height and volume of material within the dune at each assessment location. A number of significant assets with high economic and social value were located within the immediate design storm erosion zone, including:

- Aerodrome Road/Alexandra Parade (state-controlled road)
- Alex Heads Surf Club and foreshore including skate park
- Maroochydore Beach Holiday Park
- Maroochydore Surf Club
- Public space including pedestrian and cycle pathways
- Beach access locations.

Enhancing and widening the beach within the study area, in order to improve the level of storm protection, was the primary objective of the Project. It was estimated that 240,000 m^3 of beach nourishment sand was required to construct a sufficient storm erosion buffer for Maroochydore Beach (BMT WBM, 2012).

Pre-project Conditions

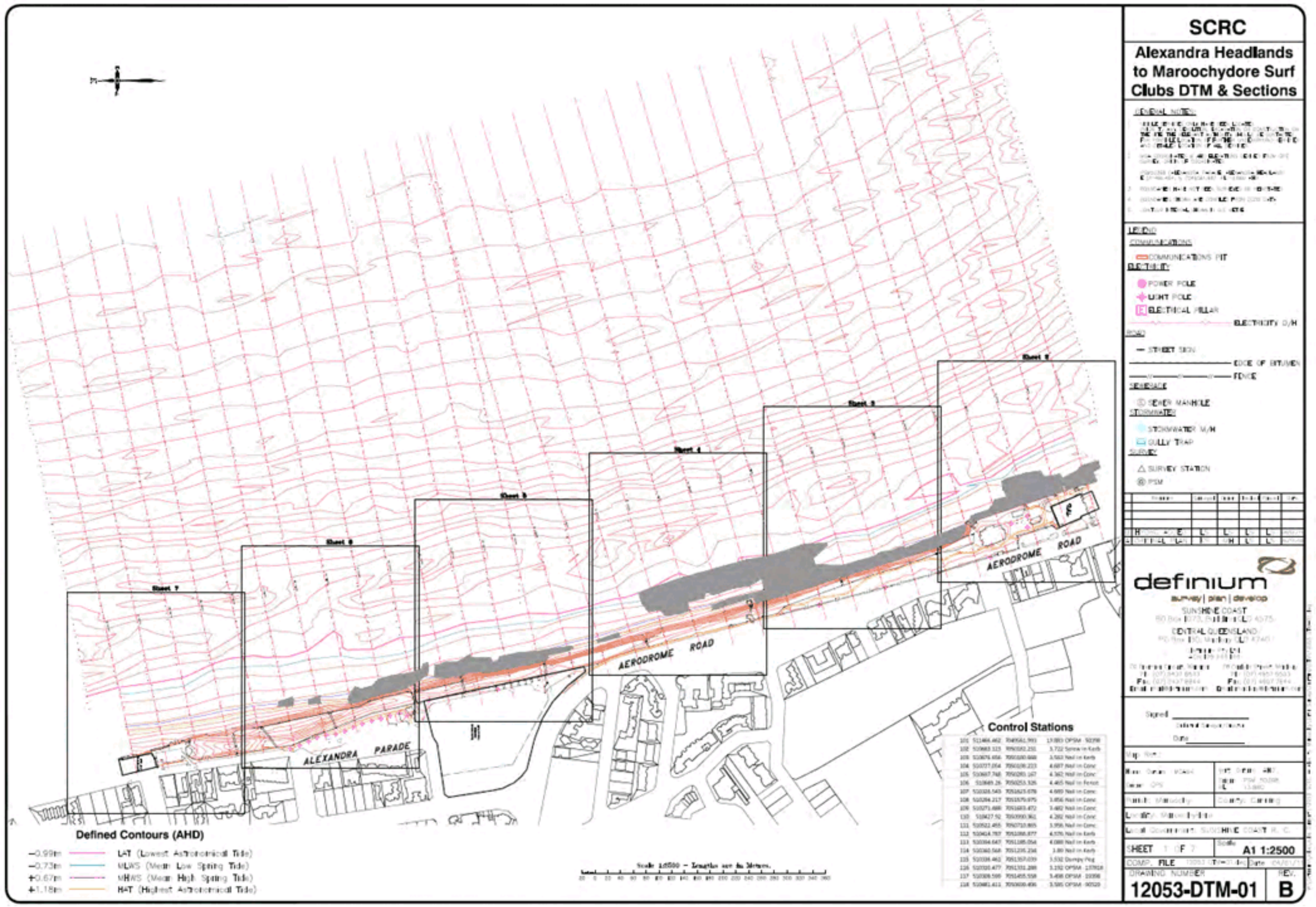

Figure 2-1 Maroochydore Beach Offshore Bathymetry and Exposed Coffee Rock Pre-nourishment

Figure 2-2 Exposed Coffee Rock Looking South (top) and North (bottom) from the Okinja Road Beach Access (photos courtesy of SCC)

2.2 Maroochy River Sand Source

Historically, the Maroochy River mouth has been very mobile with the entrance located both to the north and the south of Pincushion Island. During the early 1990s, the southern channel became very dominant and erosive pressure on the river bank near the Cotton Tree Caravan Park resulted in the construction of two geotextile groynes in 1995.

Continued erosive pressure resulted in a breakthrough of the entrance south of Pincushion Island in 1999, and the subsequent threat to the Cotton Tree Holiday Park from shoreline recession resulted in the construction of the southern geotextile groyne and some geotextile seawall sections in 2001. Three additional geotextile groynes and seawalls were subsequently constructed in 2003. The intention of these groynes and seawalls was to protect the Holiday Park whilst maintaining some amenity on the beaches between the groynes.

The lower estuary contains a significant volume of sand that once formed the frontal dunes and beach that connected Cotton Tree to Pincushion Island. A sand investigation was completed in December 2011 by Cardno Bowler Pty Ltd on behalf of the SCC. The total investigation area is shown in Figure 2-3. The sediment sampling targeted potential sub-areas to extract sand for the purpose beach nourishment. Sediment samples were laboratory analysed for Particle Size Distribution (PSD) and Acid Sulfate Soils. Key findings relevant to the Project included:

- The target depth for sediment boreholes was 3 m below the existing sediment surface level however some boreholes were terminated slightly above this depth due to the presence of stiff clays. It was therefore assumed that any sand extraction operation for the purpose of beach nourishment would not exceed a dredge depth of 3 m.
- PSD analysis identified a dominance of non-cohesive sand material and a high proportion of particles with a diameter between 150-425 µm. This range in grain size was considered consistent with the material found on Maroochydore Beach where the median sand grain size diameter (D_{50}) is approximately 200 µm.
- The presence of Acid Sulfate Soils was detected however the in the majority of samples the levels of acidity were very low and in all cases the material intrinsic acid neutralising capacity exceeds the potential of the material to generate acidity. As such no further treatment of the materials tested would be necessary.
- While the dominant particle size was consistent with that typically sort for beach nourishment purposes, the material quality present at the three most upstream areas was considered suitable for nourishment at Maroochydore Beach. This was based on the variable make-up of the material including colour and silt content.
- The sampled sediment within the most downstream location (near Cotton Tree) contained sand that was generally more uniform and paler in colour. This was the recommended area to target for beach nourishment purposes.

The outcomes of the Cardno Bowler (2011) investigation helped to guide the selection of the target dredge area for beach nourishment sand. The original permitted area (November 2012) is shown in Figure 1-1. The permitted area was amended in 2015 (prior to the Stage 2 works commencing) in order to avoid undesirable silt material encountered during the Stage 1 works.

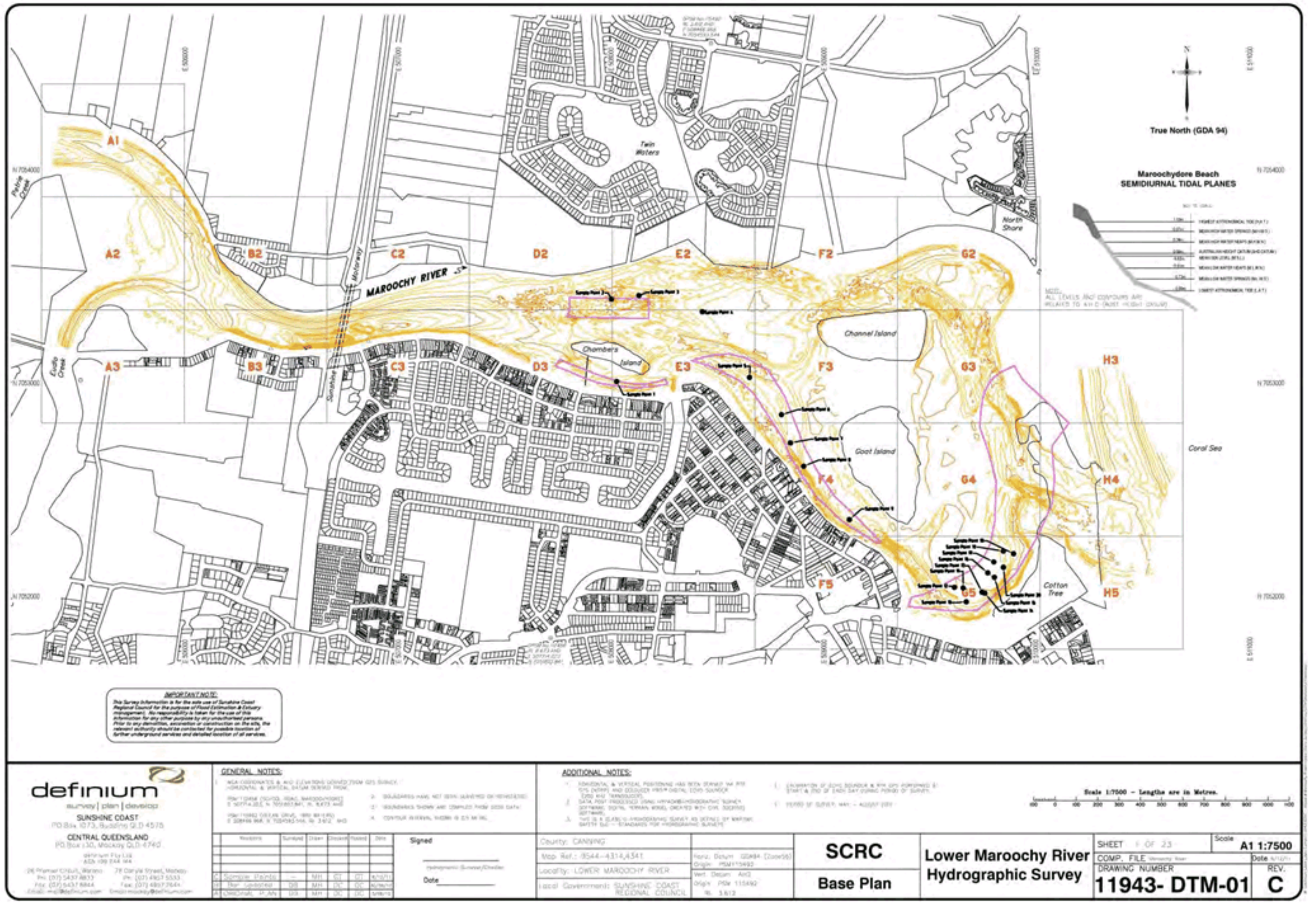

Figure 2-3 Lower Maroochy River Bathymetry and Sand Investigation Areas

3 Summary of Works

3.1 Pipeline Installation

A sand delivery pipeline extending from Cotton Tree to the Alexandra Headland skate park was installed during April 2013 prior to the Stage 1 dredging and nourishment. The slurry pipeline alignment and disturbance area is shown in Figure 3-1.

3.2 Stage 1 Dredging and Nourishment

Stage 1 works were completed by Birdon Pty Ltd between May and September 2013 and involved relocation approximately 125,000 m^3 of sand from the permitted area within the lower Maroochy River to Maroochydore Beach. The sand was relocated via a CSD and pipeline and redistributed at the beach by standard earthworks equipment (see Figure 3-2). Prior to the works the beach was in a severely eroded state. Stage 1 before and after nourishment photos are also shown in Figure 3-2.

3.3 Stage 2 Dredging and Nourishment

The second dredging and nourishment campaign involved the relocation of 75,000 m^3 of sand and was completed by Neumann Contractors Pty Ltd during June and July 2015. The beach was in a fair condition prior to the works with some patches of coffee rock visible in the vicinity of the Okinja Road beach access (see Figure 3-3). Prior to dredging, an amendment to the lower Maroochy River sand extraction footprint in order to avoid undesirable silt material was approved by DEHP.

3.4 Stage 3 Dredging and Nourishment

The third and final nourishment campaign was undertaken by Neumann Contractors Pty Ltd during February and March 2016. This ‘top up’ campaign relocated 20,000 m^3 of sand in order to provide a resilient and safe beach for the Australian Surf Lifesaving Championships (‘The Aussies’) held between 16 and 24 April 2016 (see Figure 3-4). Prior to dredging an amendment to the EPBC referral and DEHP permit conditions to allow dredging during the months of February and March was approved. The amendment required an area at North Shore Spit to be closed to the public to provide undisturbed habitat for migratory shorebirds.

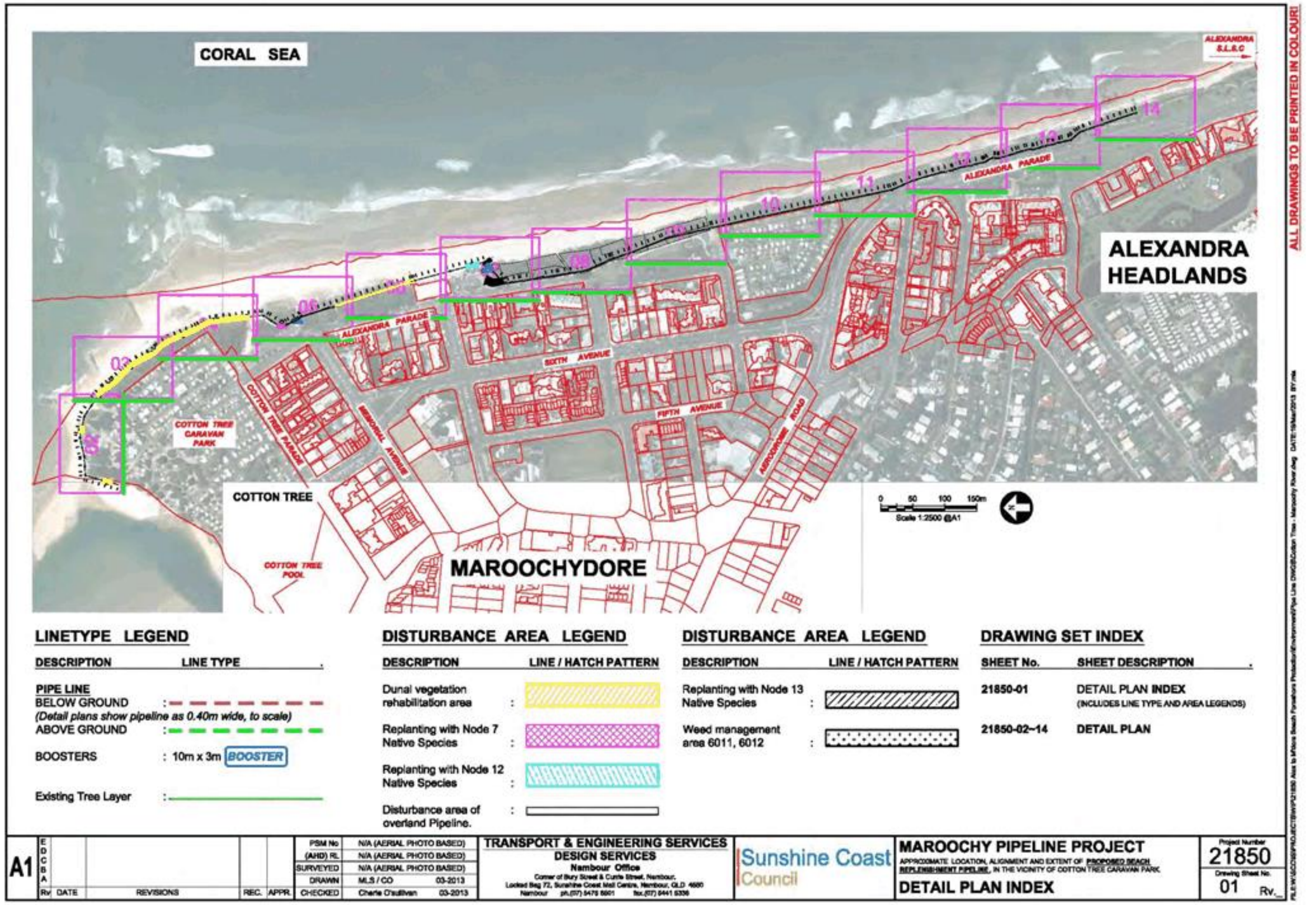

Figure 3-1 Slurry Pipeline Alignment and Disturbance Areas

Figure 3-2 Stage 1 Dredging and Nourishment (clockwise from top left): Birdon Pty Ltd CSD Dogo in the Lower Maroochy River; Sand Delivery to Maroochydore Beach; Beach Condition after Nourishment Works; Beach Condition before Nourishment Works

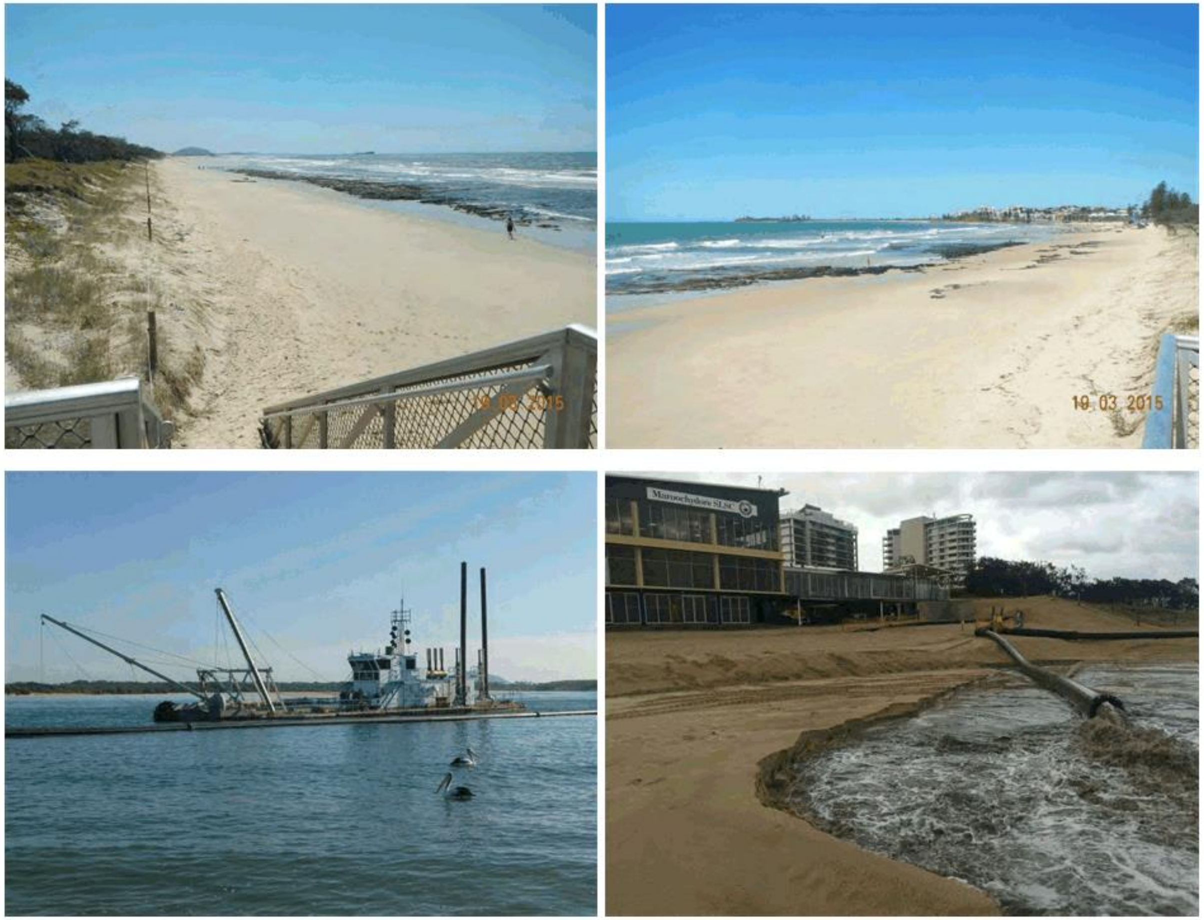

Figure 3-3 Stage 2 Dredging and Nourishment (clockwise from top left): Pre-works Beach Condition North; Pre-works Beach Condition South; Pipeline Sand Delivery to Maroochydore Beach; Neumann CSD *Nu Endeavour* in the Lower Maroochy River

Figure 3-4 Stage 3 Dredging and Nourishment (clockwise from top left): Restricted Pedestrian Access at North Shore Spit; Sand Delivery to Maroochydore Beach; 'The Aussies' at Maroochydore Beach, April 2016

4 Coastal Processes during the Project

4.1 Introduction

Understanding the beach response to the local wave climate is important aspect of any shoreline erosion management strategy. When evaluating the performance of beach nourishment campaigns, it's important to consider the conditions that prevailed during the project. In this Chapter the local coastal processes during the Project are summarised and considered in the context of the historical record and previously reported conditions relevant to Maroochydore Beach.

4.2 Storm History

Two of the more severe weather events to occur during the project were related to ECL pressure systems that impacted in the Sunshine Coast Region during May 2015 and June 2016. Composite maps showing Mean Sea Level Pressure and precipitation forecast snapshots of these events are shown in Figure 4-1 and Figure 4-2. These weather systems generated high energy seas and caused significant coastal erosion along the east coast of Australia. However, on both occasions the more severe impacts occurred to the south of the Sunshine Coast region. The local conditions during these events are considered further in the following sections.

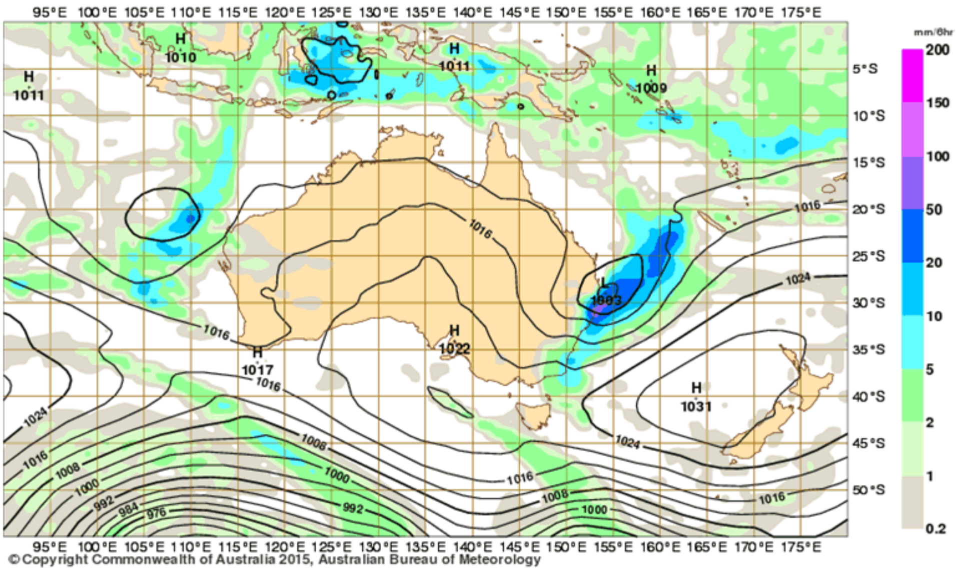

Figure 4-1 May 2015 East Coast Low – Mean Sea Level Pressure and Precipitation Composite Map

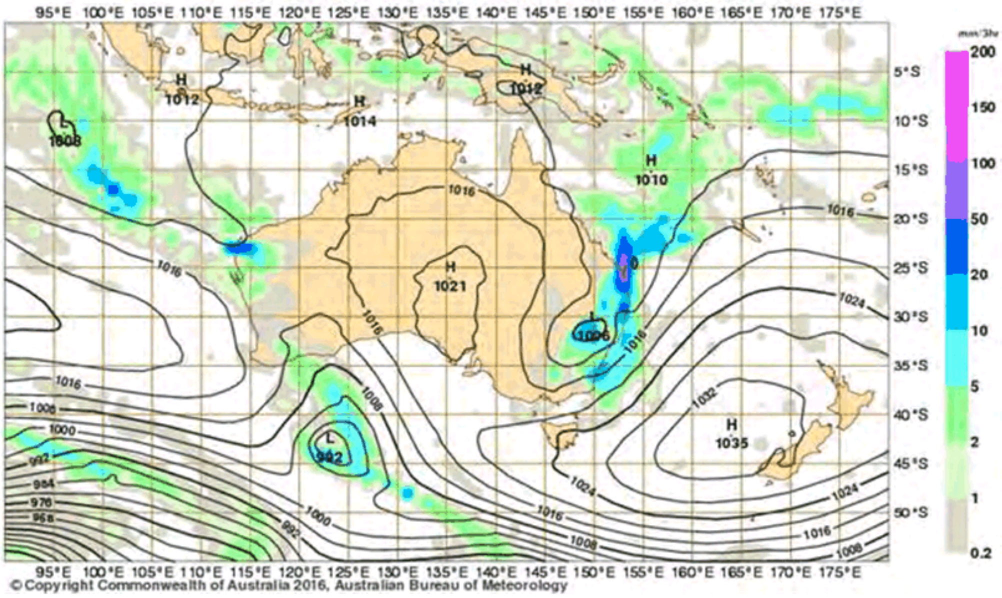

Figure 4-2 June 2016 East Coast Low – Mean Sea Level Pressure and Precipitation Composite Map

4.3 Tides and Surge

The tides in the region are predominantly semi-diurnal. The mean spring tide range at Maroochydore Beach is 1.36 m, while the extreme tidal range under astronomical conditions is 2.17 m. The astronomic tidal planes for the nearby Mooloolaba Standard Port gauge location are shown in Table 4-1.

Extreme water levels well in excess of the Highest Astronomical Tide (HAT) can be generated during severe weather events. The observed extreme water level, or 'storm tide', is the total water level caused by the combination of tide and surge. The surge, or 'residual tide', is generated by low atmospheric pressure, wind action over the water surface and wave processes. The surge corresponds to the height above the expected astronomical tide at a given time.

Major surge events within southeast Queensland are typically associated with east coast low or tropical cyclone weather systems. The three largest surge events recorded at the Mooloolaba Storm Tide gauge were associated with tropical cyclone activity:

- TC Dinah (January 1967) ≈ 0.9m.
- TC Daisy (February 1972) ≈ 0.7m.
- TC David (January 1976) ≈ 0.6m.

Surges greater than 0.25 m are relatively common at the Mooloolaba tide gauge, on average occurring approximately twice per year. Surges generated by ECL weather systems are more common than those generated by tropical cyclones, and account for roughly two thirds of the largest surge events since 1965 (the year tide recording commenced at Mooloolaba).

Previous surge and storm tide risk assessments relevant to the Project area are summarised in Table 4-2. Each study provided design water levels for Maroochydore Beach that include the influence of wave action. The Ocean Hazards Assessment Stage 2 (Hardy et al., 2004) provided tropical cyclone-induced design water levels for the Sunshine Coast. More recently, Aurecon (2013) derived storm tide levels from recorded data and established a 100-year ARI water level of 1.63 m AHD for Maroochydore Beach, corresponding to 0.45 m above HAT. This level does not include the influence of wave action on the extreme water level which can be significant on exposed beaches. The additional contribution of wave setup on the extreme water level at Maroochydore Beach is estimated to be in excess of 1 m at the 100-year ARI (e.g. Hardy et al., 2004; Aurecon, 2014).

The water level at the Mooloolaba tide gauge and the calculated tidal residual recorded during the Project is shown in Figure 4-3. The maximum water level during this period was 1.4 m AHD which is approximately 0.22 m above HAT but below the 20-year ARI surge plus tide level. The maximum tidal residual recorded during the Project was 0.34 m. This analysis suggests that ‘typical’ variations in water level were experienced during the Project.

The recorded water level and residual tides during the May 2015 and June 2016 ECL events are shown in Figure 4-4 Figure 4-5. Neither event generated a water level the exceeded the HAT.

Table 4-1 Mooloolaba Standard Port Tidal Planes (Maritime Safety Queensland, 2016)

Tidal Plane	Level (mAHD)
Highest Astronomical Tide (HAT)	+1.18
Mean High Water Springs (MHWS)	+0.67
Mean High Water Neaps (MHWN)	+0.34
Mean Sea Level (MSL)	-0.03
Mean Low Water Neaps (MLWN)	-0.41
Mean Low Water Springs (MLWS)	-0.73
Lowest Astronomical Tide (LAT)	-0.99

Table 4-2 Design Surge plus Tide Levels at Maroochydore Beach (Aurecon, 2013)

20-year ARI (m AHD)	50-year ARI (m AHD)	100-year ARI (mAHD)
1.45	1.55	1.63

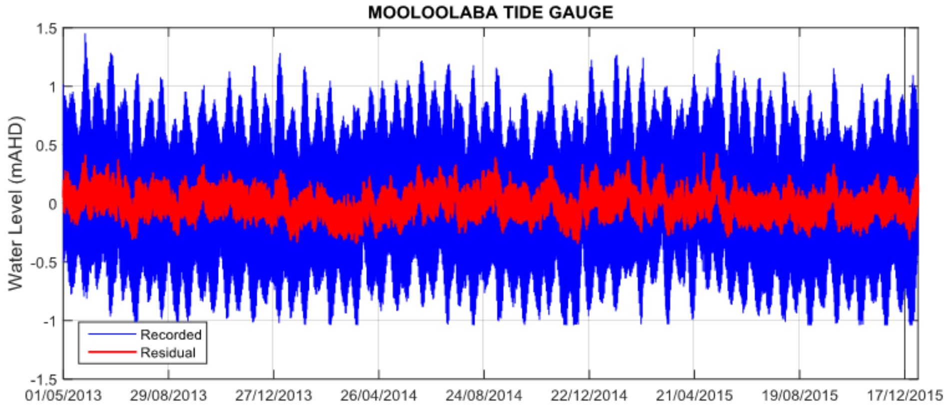

Figure 4-3 Recorded Water Level and Residual at Mooloolaba Tide Gauge during the Project (data provided by DSITI)

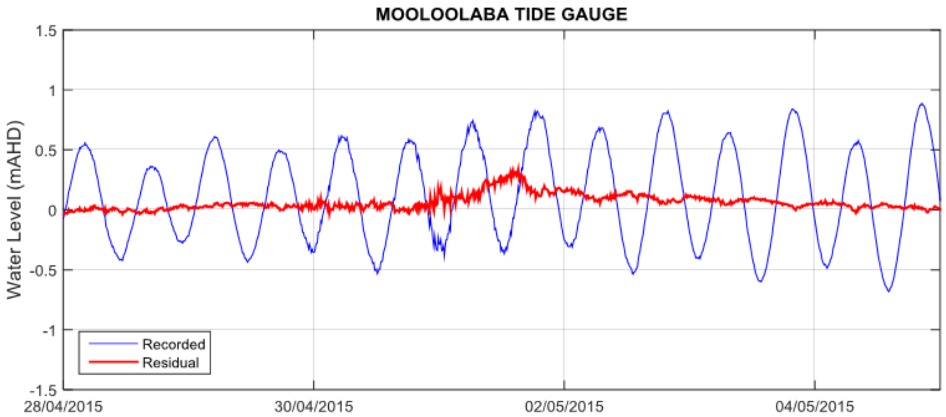

Figure 4-4 Recordings at the Mooloolaba Tide Gauge during the April/May 2015 ECL (data provided by DSITI)

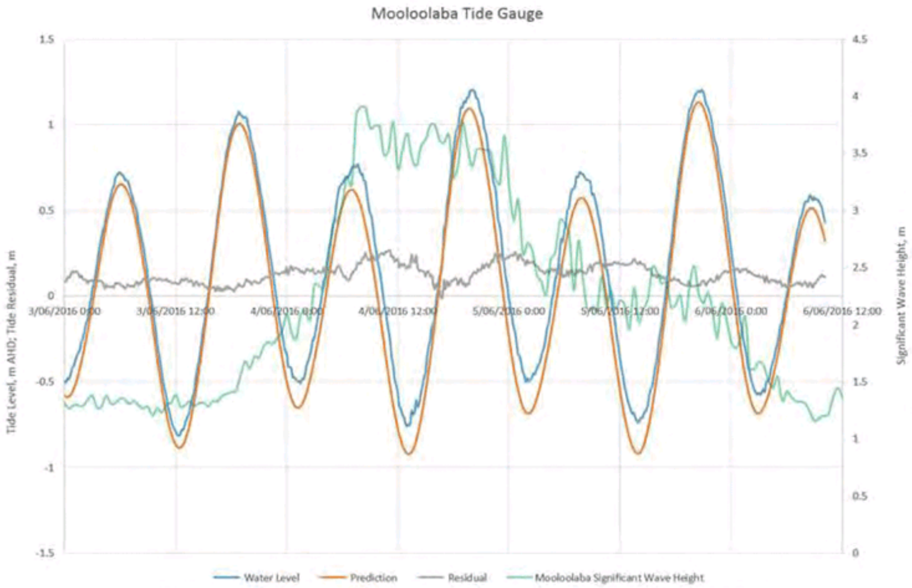

Figure 4-5 Recordings at the Mooloolaba Tide Gauge and Wave Buoy during the June 2016 ECL (data provided by SCC and DSITI)

4.4 Waves

The Sunshine Coast wave climate is a combination of ocean swell and locally wind-generated 'seas'. The swell waves are of long period (typically 7-12 seconds) and experience significant modification due to refraction, bed friction and shoaling as they propagate to the shoreline from the deep ocean. The region experiences a persistent ground swell from the southeast; however, Moreton Island acts to shelter a large section of the Sunshine Coast from these swells. The sheltering influence from Moreton Island progressively decreases moving north along the Sunshine Coast. More locally to the study area, Point Cartwright also modifies the swell wave height and direction which in turn influences the local sediment transport regime. Wind generated sea waves are of relatively short period (generally less than 4 seconds) and are not substantially affected by the offshore bathymetry prior to breaking nearshore.

DEHP operate and maintain a wave buoy located due east of Yaroomba, commonly referred to as the 'Mooloolaba Wave Buoy'. Non-direction wave recordings commenced in 2000 and in 2005 a directional wave recorder was installed. The instrument is presently located approximately 8 km offshore in a water depth of 33 m. A wave rose illustrating the distribution of significant wave height and direction during the Project (up to January 2016) is shown in Figure 4-6. The significant wave height time series is provided in Figure 4-7. The available offshore wave data suggests:

- The offshore wave climate is of moderate to high energy, with an average significant height of 1.2 m during the Project. It is noted that the maximum significant wave height of 5.2 m was recorded in early May 2015 during the ECL event (Figure 4-8). The maximum significant wave height during the June 2016 ECL was 4.1 m (see Figure 4-5, plotted together with Mooloolaba tides).

- Both longer periods (8 to 15 seconds) swell and shorter period (5 to 7 seconds) sea waves are common along the open coast and at times may co-exist, sometimes with differing directions.
- The offshore swell waves are predominantly from the east-northeast to southeast directions. The east-northeast sector waves are seasonal, predominantly during spring through summer and are typically generated by local winds. These waves are usually of lower height and shorter period than the prevailing southeast sector swell waves. The exception is when an ECL or tropical cyclone system develops in the Coral Sea and produces high-energy, north-easterly conditions.

Table 4-3 summarises design wave heights for Maroochydore Beach previously derived by BMT WBM (2013). Recordings from the nearby Mooloolaba Wave Buoy indicate that the 20-year ARI wave height was not exceeded during the Project. This analysis suggests that a 'typical' or non-extreme wave climate was experienced at Maroochydore Beach.

It is noted that rapidly changing wind fields, such as those associated with tropical cyclones, were not considered in the previous wave assessment reported by BMT WBM (2013). In their detailed storm tide study, Hardy et al. (2004) simulated a very large population of synthetic tropical cyclones that represented approximately 3,000 years. For the Sunshine Coast, the average tropical cyclone induced 100-year ARI offshore wave height was 9.4 m.

Table 4-3 Design Significant Wave Heights at Maroochydore Beach (BMT WBM, 2013)

20-year ARI (m)	50-year ARI (m)	100-year ARI (m)
5.6	6.0	6.3

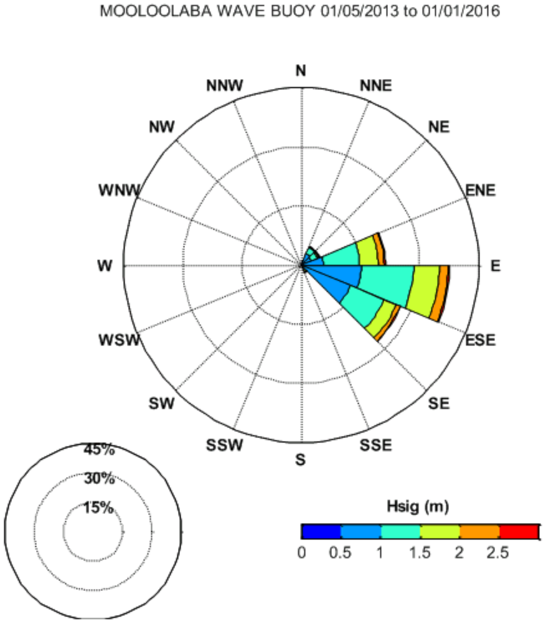

Figure 4-6 Wave Rose at Mooloolaba Wave Buoy during the Project (data provided by DSITI)

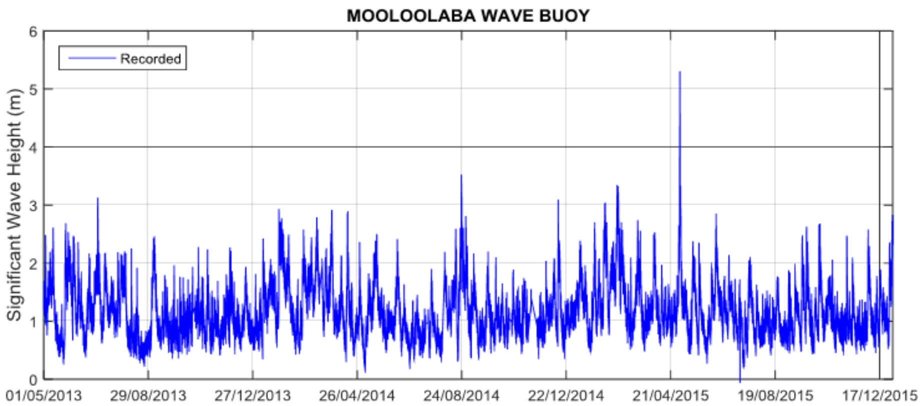

Figure 4-7 Recordings at Mooloolaba Wave Buoy during the Project (data provided by DSITI)

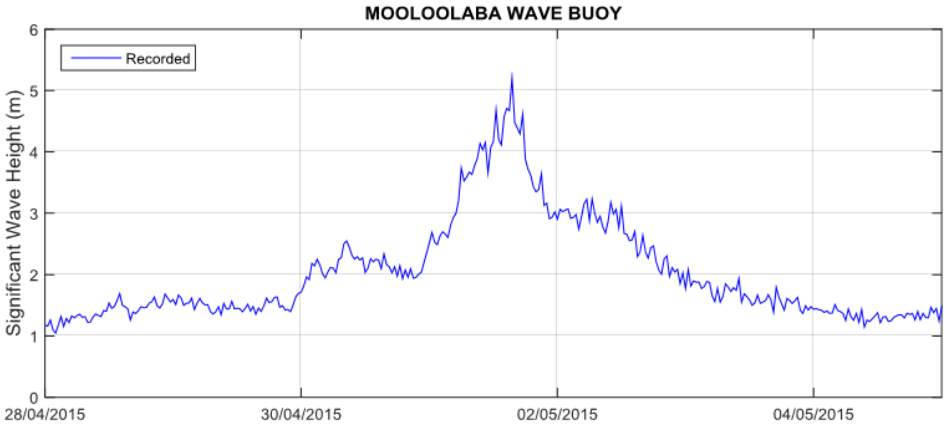

Figure 4-8 Recordings at the Mooloolaba Wave Buoy during the April/May 2015 ECL (data provided by DSITI)

4.5 Sediment Transport Potential

4.5.1 Longshore Sand Transport

Longshore sand transport results predominantly from waves breaking at an angle to the shore with an alongshore component of their radiation stress that drives longshore currents. The wind and tide may also contribute to the generation of currents near the beach. The longshore sand transport is distributed across the surf zone and typically peaks near the wave break point where the wave height, longshore current and bed shear are greatest.

Beach compartments will remain stable in the long term (without erosion or accretion) where there is a balance between the sand entering the system and the sand leaving the system. Recession of a sandy beach is the result of a long term and continuing net loss of sand from the beach compartment. According to the sediment budget concept, this occurs when more sand is leaving than entering the beach compartment. Long term shoreline recession tends to occur when:

- Outgoing longshore transport from a beach compartment is greater than the incoming longshore transport;
- There are sediment sinks within the system or sand is removed from the active beach system; and/or
- There is a landward loss of sediment by windborne transport.

A beach may remain stable (without net erosion or accretion) where the longshore sand transport is uniform along the coast. However, where there are differentials in the rates of longshore transport, including any interruption of the sand supply to an area, then the beach will erode or accrete in response. Because longshore and cross-shore transport coexist, progressive net sand losses due to a longshore transport differential may not manifest as erosion of the upper beach until storm erosion occurs, and less sand is subsequently returned to the beach/dune than was previously there.

The rate of longshore sediment transport during the Project (up to January 2016) was estimated using methods originally described in the Shore Protection Manual (CERC, 1984). The so-called "CERC equation" relates the longshore transport to the wave energy flux at the wave breaker location:

$$Q_l = K(EC_n)_b \sin\alpha_b \cos\alpha_b \qquad \text{Equation 1}$$

where Q_l is the volumetric rate of longshore sediment transport, K is a dimensionless constant, $(EC_n)_b$ is the wave energy flux evaluated at the breaker point and α_b is the wave breaker angle.

Existing SWAN wave models described in BMT WBM (2013) and linear wave theory was used to estimate the wave energy flux and the wave breaker angle at numerous locations along Maroochydore Beach. Three-hourly wave energy flux estimates were obtained for the period May 2013 to January 2016. This period corresponds to the available directional wave data at the Mooloolaba Wave Buoy (necessary for the wave model boundary condition).

The net and gross wave-driven longshore sediment transport between Alexandra Heads and Maroochy Surf Clubs was calculated using the CERC equation and the estimated inshore wave climate. Figure 4-9 shows the cumulative longshore sediment transport volume for the Project period (positive gradient is in the northerly direction). It is noted that the reported transport rates represent transport potentials. Actual sand transport rates may be restricted by the availability of sand. For example, at locations where exposed coffee rock exists on the beach or in surf zone from time to time, the actual longshore sand transport rates may be smaller than those predicted. Results of the longshore sediment transport modelling are summarised below:

- There was a net northerly longshore sand transport potential along Maroochydore Beach that increased progressively from approximately 10,000 m^3 at Alexandra Heads Surf Club to approximately 95,300 m^3 at the Maroochy Surf Club during the Project.
- The steep gradients in longshore sediment transport potential, particularly evident at the Maroochy Surf Club location shown in Figure 4-9, correspond to sustained periods with the offshore significant wave height exceeding 2.5 m (see Figure 4-7).
- The net northerly littoral drift transported approximately 35,000 m^3/year of sand out of the Maroochydore Beach compartment. It is assumed that this sand either enters and deposits in the lower Maroochy River or bypasses the entrance and is transported to the North Shore Spit. A much smaller volume (<4,000 m^3/year) is predicted to enter the beach compartment at Alexandra Heads. The average annual deficit of sand is therefore approximately 30,000 m^3.

The estimates of longshore sediment transport potential are considered in the context of the beach survey monitoring results presented in Chapter 5.

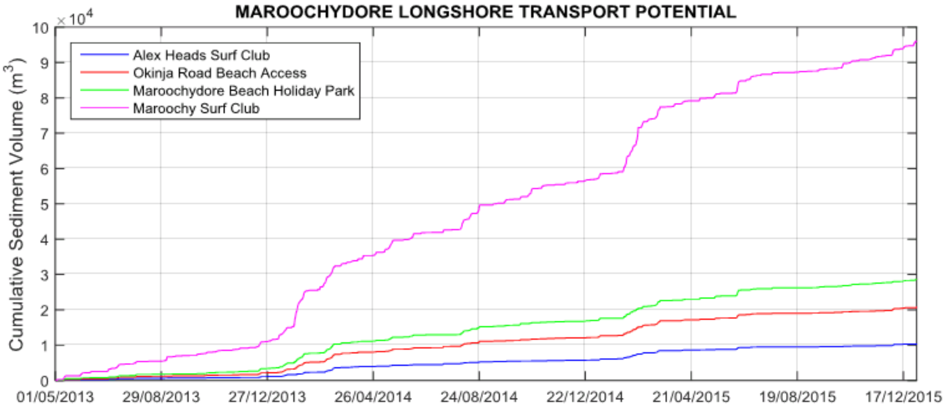

Figure 4-9 Cumulative Volume of Longshore Sediment Transport

4.5.2 Cross-Shore Sand Transport

Larson and Kraus (1989) developed a cross-shore sand transport criterion that incorporates wave steepness and sand fall velocity. Subsequent work by Kraus (1990) further verified the criterion to a number of datasets and proposed the following simple approximation:

$$\frac{H_o}{wT} < 3.2 \qquad \text{accretion}$$

$$\frac{H_o}{wT} > 3.2 \qquad \text{erosion}$$

where H_o is the offshore wave height, *w* is the sand grain fall velocity in still water and *T* is the wave period.

Using the wave data from the Mooloolaba Wave Buoy, the cross-shore sand transport criterion was explored using the half-hourly wave condition (wave height and period) and an estimated fall velocity for 300 μm sand grains of 0.039 m/s (e.g. McLellan and Kraus, 1991). The results of this assessment have been summarised into the number of estimated "accretion" or "erosion" days per month between May 2013 and December 2015 and are presented in Table 4-4. The 'dominant' monthly condition is also indicated and suggests that during the Project there were 15 months dominated by accretion compared to 17 months dominated by erosion.

The cross-shore sand transport assessment results presented in Table 4-4 generally follow the typical beach response observed throughout southeast Queensland, that is beach erosion during the summer and autumn (December to May) and beach recovery during winter and spring (June to November). Following Larson and Kraus (1989), erosion is caused by periods of high steepness waves such as those generated by tropical cyclones, extra tropical storms or ECL pressure systems. The monthly cross-shore estimates are considered further in Chapter 5.

Table 4-4 Estimates of Cross-Shore Transport Dominant Condition

Month-Year	Wave Data Days	Accretion Days	Erosion Days	Dominant Monthly Condition
May-13	31	15	16	weak erosion
Jun-13	30	17	13	weak accretion
Jul-13	31	11	20	erosion
Aug-13	31	23	8	accretion
Sep-13	30	16	14	weak accretion
Oct-13	29	13	16	weak erosion
Nov-13	30	17	13	weak accretion
Dec-13	31	16	15	weak accretion
Jan-14	31	5	26	erosion
Feb-14	28	8	20	erosion
Mar-14	28	7	21	erosion
Apr-14	30	19	11	accretion
May-14	31	17	14	weak accretion
Jun-14	28	19	9	accretion
Jul-14	28	25	3	accretion
Aug-14	28	7	22	erosion
Sep-14	30	16	13	accretion
Oct-14	26	15	12	weak accretion
Nov-14	21	7	14	erosion
Dec-14	31	15	16	weak erosion
Jan-15	31	11	20	erosion
Feb-15	27	3	24	erosion
Mar-15	32	13	19	erosion
Apr-15	30	15	15	weak accretion
May-15	30	16	15	weak accretion
Jun-15	30	11	19	erosion
Jul-15	31	21	10	accretion
Aug-15	31	24	7	accretion
Sep-15	28	14	14	weak erosion
Oct-15	31	14	17	weak erosion
Nov-15	30	15	15	weak erosion
Dec-15	31	14	17	weak erosion

5 Monitoring

5.1 Introduction

Ongoing monitoring of sand extraction and placement areas is an important aspect of beach nourishment projects and provides information regarding:

- Accurate estimates of the volume of sand extracted and placed on the beach;
- The benefit and longevity of the works; and
- The need and feasibility of future sand extraction and nourishment works.

In accordance with DEHP permit conditions, monitoring to support the Maroochydore Beach Nourishment Project included:

- Beach profile surveys pre- and immediately post-sand nourishment works (from the upper beach to low water mark).
- Beach profile surveys at two (2) monthly intervals over the 12 months following the sand nourishment works.
- Hydrographic (bathymetric) survey of the sand borrow (i.e. sand source) area pre- and immediately post-sand extraction works.

The beach and borrow area monitoring to support Stage 1 and Stage 2 of the Project is summarised in the following sections.

5.2 Lower Maroochy Sand Source

5.2.1 Stage 1

The Stage 1 post-works hydrographic survey of the permitted sand extraction area is shown in Figure 5-1. Throughout this area sand was dredged to an average elevation of -3.0 mAHD, corresponding to a sand volume of approximately 125,000 m^3.

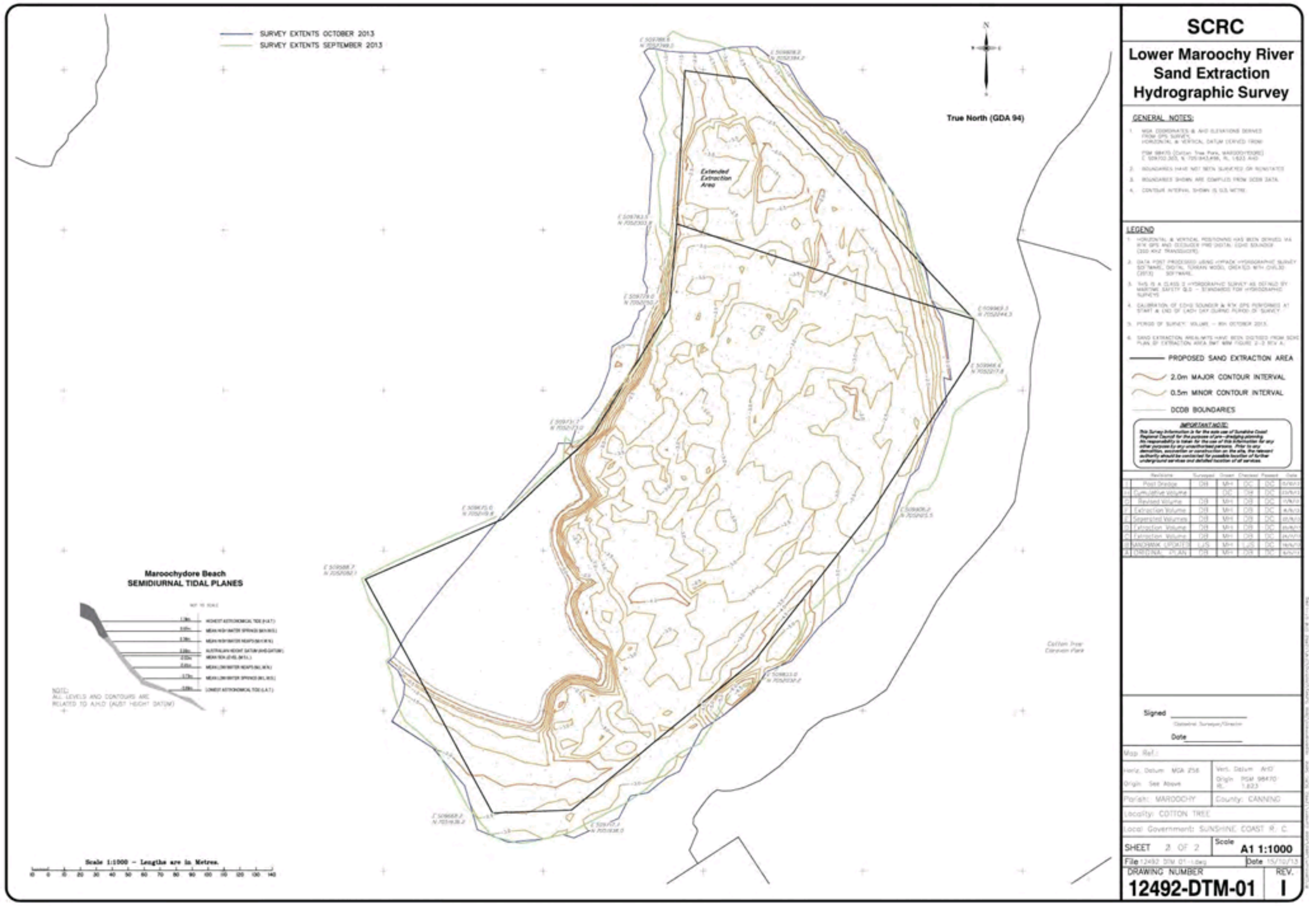

Figure 5-1 Stage 1 Post Works Sand Extraction Survey October 2013

5.2.2 Stage 2

Prior to Stage 2 dredging works commencing in June 2015 the existing permitted area was surveyed and estimated to contain approximately 75,000m^3 of sand suitable for renourishment purposes (Definium, pers. comm. 2015). This estimate considered a depth to 3 m below AHD and excluded the southwest corner of the permitted area where a more variable sediment profile was identified during dredging in 2013.

Most of the available volume was attributed to material that infilled the permitted sand extraction area since the previous dredging and renourishment campaign. Figure 5-2 provides a comparison of hydrographic surveys obtained at the completion of the 2013 dredging and prior to the commencement of Stage 2 dredging in 2015. This comparison suggests a fill volume of 73,327 m^3 (indicated under General Notes in Figure 5-2) between October 2013 and June 2015 which corresponds to an infilling rate of approximately 50,000 m^3/year. Based on this finding and the existing dredging and renourishment practices, Council could expect the lower Maroochy River sand source to sustainably provide up to 100,000 m^3 every two years (subject to ongoing monitoring).

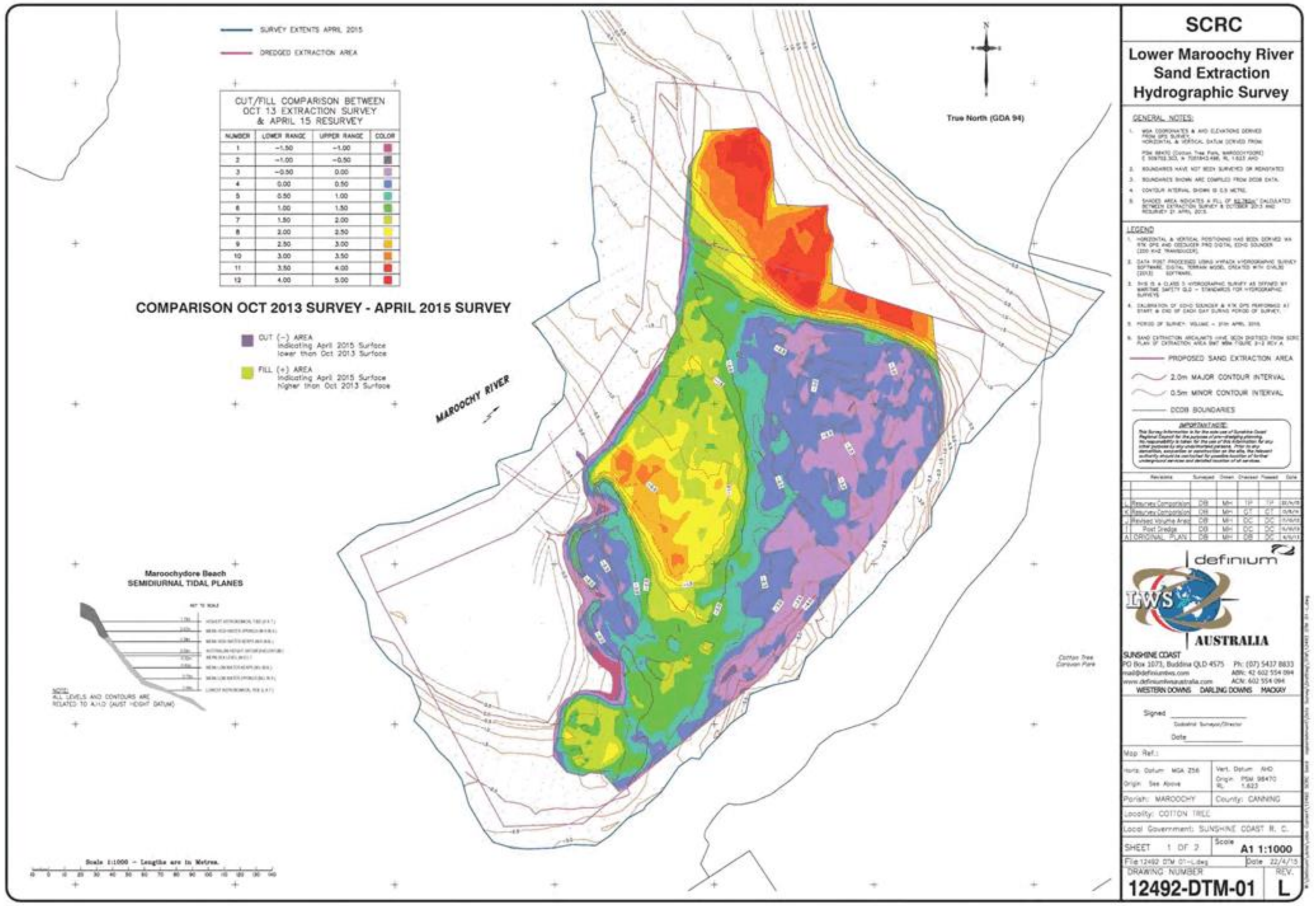

Figure 5-2 Infilling of the Permitted Dredge Footprint between October 2013 and April 2015

5.3 Maroochydore Beach

5.3.1 Stage 1

Beach profile surveys pre- and immediately post-sand nourishment works and at two monthly intervals over a 12 month period were undertaken by Definium. These surveys extended from the upper beach to low water mark in accordance with the DEHP permit conditions. Example survey plans are shown in Figure 5-1 and Figure 5-2 and survey comparisons summarising the change in the volume of sand on the upper beach are provided in Table 5-1. The following key points are noted:

- Comparison of the pre- and post-sand nourishment works surveys suggest a nourishment volume close to 102,000 m^3. The estimated sand extraction volume reported by the dredge contractor was approximately 125,000 m^3. The difference between volumes is most likely due to some sand being relocated seaward of the survey limits by wave action during the period of nourishment works.
- Between October 2013 and April 2014 approximately 50% of the placed sand was moved from upper beach to a location seaward of the survey limits. During this period the beach profile adjusted from the 'constructed' condition toward a theoretical equilibrium with the prevailing coastal processes. This sand was not lost from the beach system but rather relocated from the upper beach to the nearshore (or 'surf zone') area. The cross-shore transport estimates provided in Table 4-4 suggest erosion conditions were dominant during January, February and March 2014. A steep gradient in longshore sediment transport to the north was also estimated during these months (see Figure 4-9).
- Between April and July 2014, over 40,000 m^3 of sand moved back into the upper beach survey area. The sand causing this accretion is likely to be a combination of the nourishment material and new sand naturally entering the Maroochydore Beach system from the south. The cross-shore transport estimates in Table 4-4 suggest accretionary conditions were present during April, May, June and July 2014 which is qualitatively consistent with the survey analysis results.
- Close to 30,000 m^3 of sand was eroded from the upper beach between late July and October 2014. The largest potential for longshore sediment transport and cross-shore erosion was estimated to have occurred during the month of August (refer Figure 4-9 and Table 4-4).
- The net change in upper beach sand volume over the 12 month monitoring period was approximately -37,000 m^3.

Table 5-1 Stage 1 Upper Beach Monitoring (Definium, pers. comm. 2014)

Survey Date	Survey Plan Number	Surface Comparison to Post-nourishment Survey (m^3)	Surface Comparison between Subsequent Surveys (m^3)
1 October 2013 (post-nourishment)	12492 DTM-02 K	*101,961 (estimated fill volume)**	*NA*
21 November 2013	12492 DTM-02 D9	-1,896	-1,896
22 January 2014	12492 DTM-02 D13	-19,098	-17,202
4 April 2014	12492 DTM-02 D14	-48,997	-29,899
28 May 2014	12492 DTM-02 D15	-41,144	7,853
29 July 2014	12492 DTM-02 D16	-7,222	33,922
17 October 2014	12492 DTM-02 D17	-36,891	-29,669

*comparison of pre- and post-nourishment surveys used to estimate fill volume

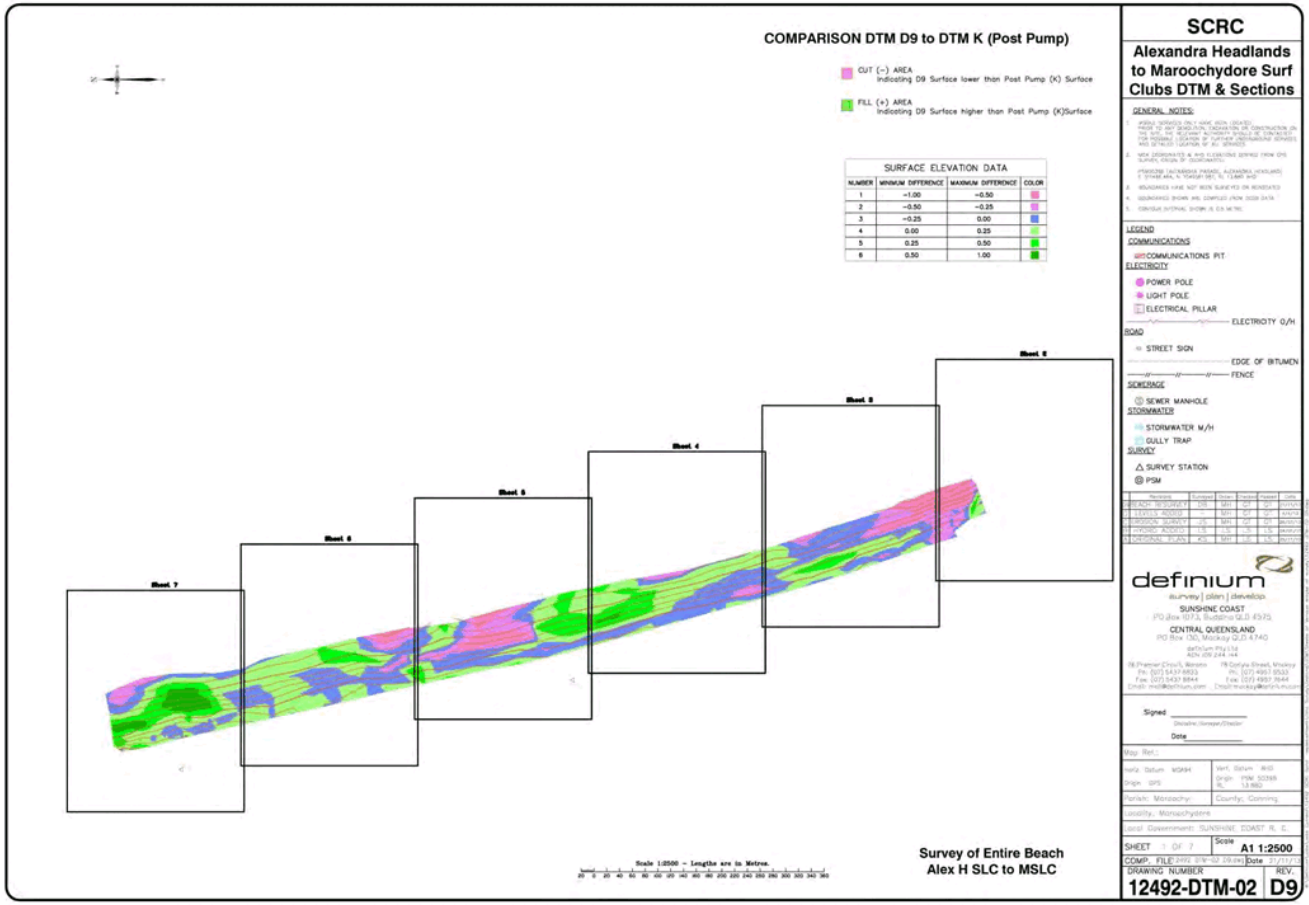

Figure 5-3 Beach profile survey approximately 2 months after Stage 1 sand nourishment works

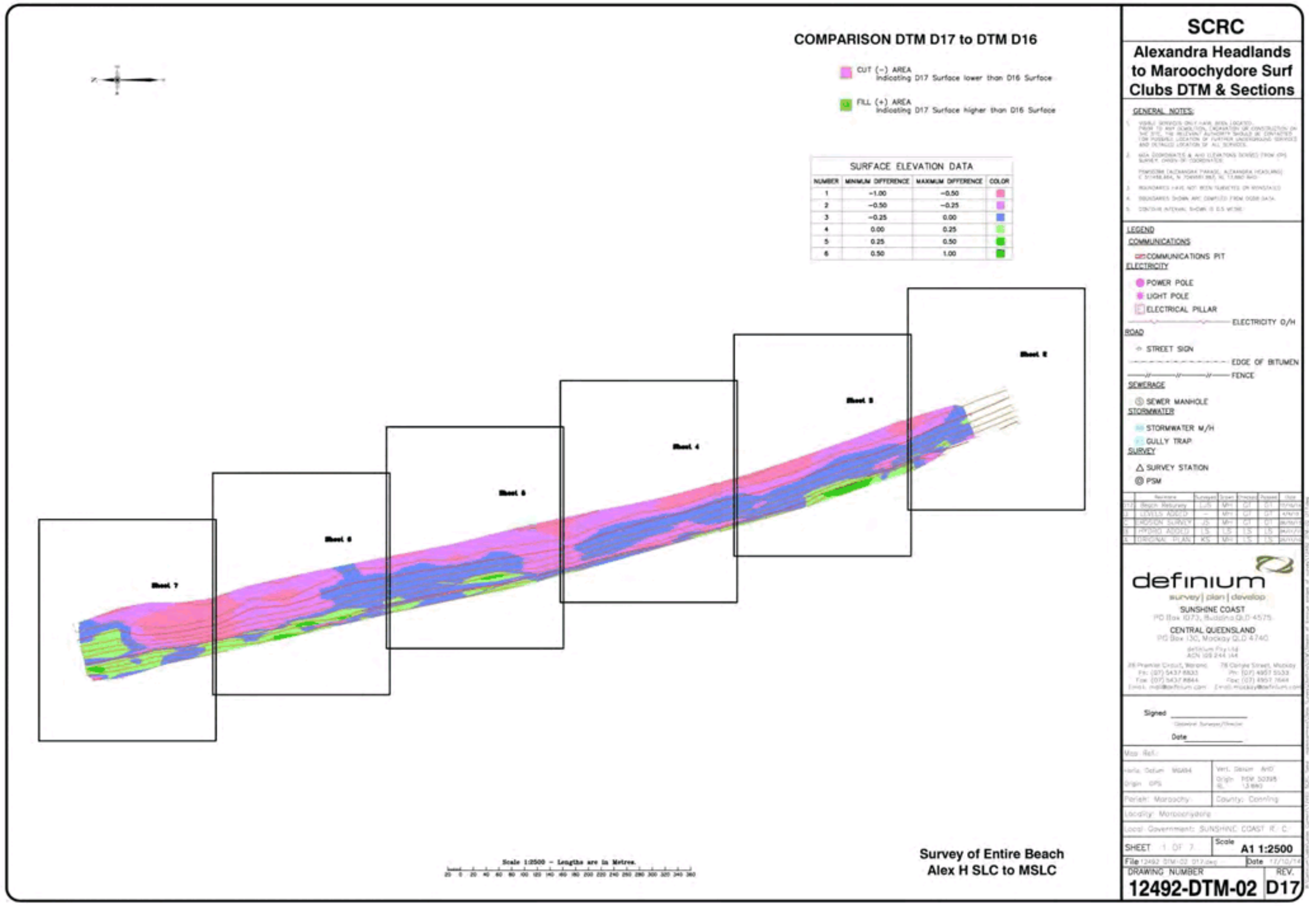

Figure 5-4 Beach profile survey approximately 12 months after Stage 1 sand nourishment works

5.3.2 Stage 2

Stage 2 beach profile monitoring was also undertaken by Definium. The change in the volume of sand on the upper beach over a 12 month period is provided in Table 5-2. The following key points are noted:

- Comparison of the pre- and post-sand nourishment works surveys suggest a nourishment volume close to 60,000 m^3. The estimated sand extraction volume reported by the dredge contractor was approximately 75,000 m^3. As discussed in Section 5.3.1, the difference between volumes is most likely due to some sand being relocated seaward of the survey limits by wave action during the period of nourishment works.
- Between late July and early December 2015, the surveys suggest a pattern of accretion on the upper beach with approximately 11,500 m^3 of sand moving landward of the low water mark. Cross-shore sediment transport estimates in Table 4-4 suggest that most of the accretion occurred during July and August 2015, with weakly erosive conditions during September, October and November.
- The surveys suggest that during the 2015/16 summer period approximately 13,000 m^3 of sand was removed from the upper beach. However, it is noted that the Stage 3 'top up' nourishment campaign (in preparation for 'the Aussies') occurred during this period which added an additional 20,000 m^3 to the upper beach profile. With this in mind, the actual volume of sand relocated from the upper beach to the surf zone during the summer period likely exceeded 30,000 m^3.
- Approximately 11,000 m^3 of sand naturally accreted on the upper beach during between March and early June 2016.
- An ECL pressure system tracked south via the Sunshine Coast region on June 4 2016 (refer Section 4.2). The post-storm survey captured on June 7 suggests close to 40,000 m^3 was removed from the upper beach over a short period.
- Relatively minor accretion of the upper beach profile was recorded by the final survey captured in late July 2016.
- The net change in upper beach sand volume over the 12 month monitoring period was approximately -24,000 m^3. It is again noted that the profile was supplemented with an additional 20,000 m^3 of nourishment material during this time.

Table 5-2 Stage 2 Upper Beach Monitoring (Definium, pers. comm. 2016)

Survey Date	Survey Plan Number	Surface Comparison to Post-nourishment Survey (m^3)	Surface Comparison between Subsequent Surveys (m^3)
27 July 2015 (post-nourishment)	12492 DTM-05 D1	*60,310 (estimated fill volume)**	*NA*
28 September 2015	12492 DTM-05 D2	6,378	6,378
1 December 2015	12492 DTM-05 D3	11,614	5,236
28 January 2016	12492 DTM-05 D4	5,672	-5,942
18 March 2016	12492 DTM-05 D5	-1,983	-7,655
2 June 2016	12492 DTM-05 D6	9,227	11,210
7 June 2016**	12492 DTM-05 D7	-27,894	-37,121
20 July 2016	12492 DTM-05 D8	-23,712	4,182

*comparison of pre- and post-nourishment surveys used to estimate fill volume
**post storm survey

5.4 Project Evaluation

Based on longshore sediment transport estimates presented in Section 4.5, the loss of sand from the Maroochydore Beach compartment during the Project period is estimated to be 100,000 m^3. Along the 1.7 km stretch of shoreline, this sand deficit corresponds to an average setback of approximately 15 m (assuming erodible material at the shoreline). This suggests that Maroochydore Beach would be in a poor condition with low value in the absence of the three year sand replenishment campaign.

Considering that a total sand volume of 220,000 m^3 was placed on the beach during the Project and the estimated deficit of 100,000 m^3 over this period, slightly more than half the nourishment material remains in the beach system. This suggests an overall net benefit to the beach system; however, it should be considered that the region did not experience a significant design storm event during the Project. Feasibility assessments prior to the Project estimated a design erosion volume between 200,000 m^3 and 260,000 m^3 for Maroochydore Beach (BMT WBM, 2012). This suggests that the beach, its values, and adjacent assets, remain vulnerable to coastal erosion events despite the success of the Project. This highlights the need for an ongoing nourishment program in perpetuity. Considerations for ongoing access to the Maroochy River sand source are discussed in the following Chapter.

6 Ongoing Program Considerations

6.1 Introduction

The environmental permits obtained for the Project are considered in this Chapter. A proposed approvals strategy to allow ongoing access to the Maroochy River sand source is discussed.

6.2 Maroochydore Beach Nourishment Project Approvals Framework

Council obtained approval to conduct dredging on the lower Maroochy River in February 2013 (though concurrence approval was received 2012). Table 6-1describes the permits currently held by SCC in relation to the dredging and associated placement. This includes dredging of the Maroochy River mouth sandbanks and within the navigation channel north of Chambers Island[1], as well as placement on the ocean beaches between Alexandra Headland and Maroochy Surf Clubs and on Chambers Island.

While permits issued by SCC for dredging and placement works (OPW12/0455 and OPW12/0454) do not have expiry dates, permits issued by the State Government are due to expire in November 2016 (June 2017 for marine plants). In addition, the referral decision for the site under the *Environment Protection and Biodiversity Act 1999* (EPBC Act) will come to an end in 2022.

In order to continue dredging and placement activities beyond the end of 2016, SCC will require the following permits:

- Development Permit from SCC Assessment Manager to allow the following:
  - ERA 16(1c) – for dredging
  - Operational works (prescribed tidal works) – for placement.
- Concurrence Approval from State Government agencies (i.e. DEHP and MSQ). If marine plants are disturbed as part of placement works, the Department of Agriculture and Fisheries (DAF) will also be required to provide Concurrence Approval.
- Environmental Authority from EHP. This will need to be held by the relevant dredge contractor (e.g. Neumann Contractors) rather than SCC.
- Referral decision by DoE *unless* it can be established by a self-assessment that a referral of the works is not necessary.

[1] Shoreline management works at Chambers Island were undertaken concurrently with stage 1 of the Maroochydore Beach Nourishment Project

Table 6-1 Approvals for Maroochy River dredging and associated placement

Permit	Description	Issuing authority	Expiry
Maroochy River mouth and ocean beaches			
OPW12/0455	Development Permit for Operational Works (prescribed tidal works – dredging and beach nourishment) Allows for dredging at Maroochy River mouth sandbanks and placement on ocean beaches • Amended by OPW12/0455.01 to allow modified dredge footprint	SCC	n/a
SPCE04927212 (held by SCC)	Concurrence Approval for Material Change of Use – ERA 16(1c) Dredging >100,000t but <1,000,000t/yr Allows dredging at Maroochy River mouth sandbanks • Amended by SPD-0715-019701 to allow modified dredge footprint • Amended by SPD-1215-023356 to allow dredging in February-March	EHP	Nov. 2016
EPPR00908213 (held by Neumann Contractors)	Environmental Authority – ERA 16(1c) Dredging >100,000t but <1,000,000t/yr Allows dredging at Maroochy River mouth sandbanks	EHP	Nov. 2016[2]
SPCC04927312	Concurrence Approval for Operational Works – tidal works, or development in a coastal management district Allows for beach nourishment on ocean beaches, including laying of pipe	EHP	Nov. 2016
2012NA0341	Concurrence Approval for Operational Works – removal, damage or destruction of marine plants Allows for removal of marine plants for beach nourishment	DAF	Jun. 2017
2015/003274	Owners Consent for Development Application – reconfiguration of dredge footprint	DNRM	n/a
EPBC 2015/7594	Referral Decision – Not Controlled Action if undertaken in a Particular Manner Allows dredging in Maroochy River and placement on ocean beaches February to March and May to September	DoE	2022
Maroochy River navigation channel and Chambers Island			
OPW12/0454	Development Permit for Operational Works (prescribed tidal works) Development Permit for Material Change of Use of Premises – ERA 16 Allows for dredging in Maroochy River navigation channel and placement on Chambers Island	SCC	n/a
SPCE04926812	Concurrence Approval for Material Change of Use – ERA 16(1b) Dredging >10,000t but <100,000t/yr Allows dredging at Maroochy River mouth sandbanks	EHP	Nov. 2014
SPCC04926912	Concurrence Approval for Operational Works – tidal works, or development in a coastal management district Allows for beach nourishment on Chambers Island (721/CG5072)	EHP	Nov. 2014
2012NA0342	Concurrence Approval for Operational Works – within a declared fish habitat area Concurrence Approval for Operational Works – removal, damage or destruction of marine plants	DAF	Jun. 2023

[2] This is assuming the 4 year limitation applied in A11 dates from the original Concurrence Approval and not from the date of the change notice (April 2015)

6.3 Ongoing Program Approvals Options

6.3.1 Local Government Permits

As the permits for dredging and placement from SCC do not have an expiry date, no update to these permits is required. However, in order to obtain a new/amended Concurrence Approval a new/amended permit should be applied for, consistent with the process discussed below.

6.3.2 State Government Permits

As discussed above, the approvals that need to be updated to allow dredging and placement to continue beyond 2016 are:

- Environmental Authority (EPPR00908213)
- Concurrence Approval from state agencies.

The options available to update these permits are:

(1) Amendment of existing permits to extend period beyond end of 2016

(2) Application for new permits to apply following the cessation (or surrender) of existing permits.

Amendment

Amending existing permits may constitute a 'permissible change' which will allow for a more rapid permitting process with lower fees. However, where the change is considered to be substantially different development, the amendment process is expected to mirror applications for new permits. Depending upon the period of the amendment, the change will increase the total volume of material originally permitted (350,000 m^3). Where the dredging period is doubled, the dredge volume will be doubled. This is expected to be seen as substantially different development.

In addition, an amendment process will not allow any substantial changes to the existing conditions. This may be of concern where any existing permit conditions are unfavourable or irrelevant (e.g. conditions related to fish passage).

New Applications

Applying for new applications will require a pre-lodgement meeting with the relevant agencies prior to preparation of a new approvals framework for the project. This will take longer than a permissible change process but is also expected to give an opportunity for to 'reset' the project approvals framework and to clean-up the multiple disparate approvals into a more consolidated framework.

6.3.3 Referral Decision

An approval from DoE under the EPBC Act is not currently required for the project due to a Referral decision made by DoE in 2015 that has declared the project Not a Controlled Action if undertaken in a Particular Manner. This decision covers the period until 2022. At the end of 2022, therefore, the Department may need to re-evaluate the situation to determine if an approval is required.

There are two options for addressing this situation:

(1) Preparation of a new referral in 2022

(2) Preparation of a self-assessment in 2022 to establish confidence that dredging will not cause a significant impact.

New Referral

A new referral decision will provide definite certainty that no approval under the EPBC Act will be required for the life of the decision. However, the decision notice is also expected to entail certain 'conditions' which will need to be enforced through dredging activities.

Self-assessment

In the alternative, a self-assessment is a tool whereby a proponent can undertake necessary studies to establish that works will not cause a significant impact. This is an internally held document (though it can be informally presented to DoE) intended as a fall back in the event questions arise as to whether works are likely to cause a significant impact. In particular, if DoE subsequently request a referral, the self-assessment can be submitted (along with relevant documentation) to form this. A self-assessment may be suitable to cover the period of dredging post 2022 as it allows SCC to set any relevant controls on dredging and placement activities.

In preparing a self-assessment, it is expected that monitoring data collected over the period of dredging (2013 to 2022) would be used to establish no significant impact. In particular, ten years of shorebird surveys and shoreline movement studies are expected to provide sufficient grounds to prepare a self-assessment.

6.3.4 Proposed Approvals Strategy

Based on the considerations above, the following approvals strategy to allow ongoing access to lower Maroochy River sand for the purpose of beach nourishment is proposed:

(1) Development of a new approvals framework (including updated environmental management plan), based on existing approvals requirements, proposed future dredging/placement methodology, and 'lessons learnt' from the Maroochydore Beach Nourishment Project (e.g. dredging locations to avoid due to the presence of silty material).

(2) Application for new permits for the period 2017 to 2022, to commence from 1st January 2017 (subsequent to cessation of previous permits). The new permits applied for would consist of Development Permit from SCC with Concurrence Approval from State Agencies, and Environmental Authority from EHP. The permits should provide for dredging of up to 100,000m^3 every two years (or other agreed volume), without a total extraction value for the period of the permit.

(3) Ongoing monitoring of impacts to shorebirds and other EPBC Act matters throughout duration of dredging.

(4) In mid-2022, preparation of an EPBC self-assessment utilising data from monitoring. If desired by SCC, this self-assessment can be presented to DoE in Canberra to have informal confirmation that no subsequent referral or approval will be required.

(5) At the same time, conduct of high-level assessments of the Maroochy River estuary and ocean beaches in order to inform application for a new extension. This assessment will allow for a 'check-up' on the area, ten years from commencement of dredging, taking into account any changes in the local environment that may change considerations for future activities.

(6) Application in 2022 for an extension/new permits to allow dredging to continue for another 5-ten years.

This approach allows for a consolidation and 'clean-up' of the existing approvals framework, based on previous learnings, with a hold-point in 2022 for ongoing checks before future extensions (if needed). The new approvals framework would provide for dredging of up to 100,000m^3 every two years (or other agreed volume).

If necessary, this approach also provides two points to allow inclusion of new areas or activities into the approvals framework, i.e. in 2016 before application for 2017-2022 approvals, and in 2022 before application for future approvals.

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