DEPARTMENT OF SUSTAINABILITY AND ENVIRONMENT

HALF MOON BAY, BLACK ROCK
BEACH RENOURISHMENT – DESIGN REPORT

May 2011

Contents

Cover photo: Half Moon Bay viewed from the north

1 Introduction

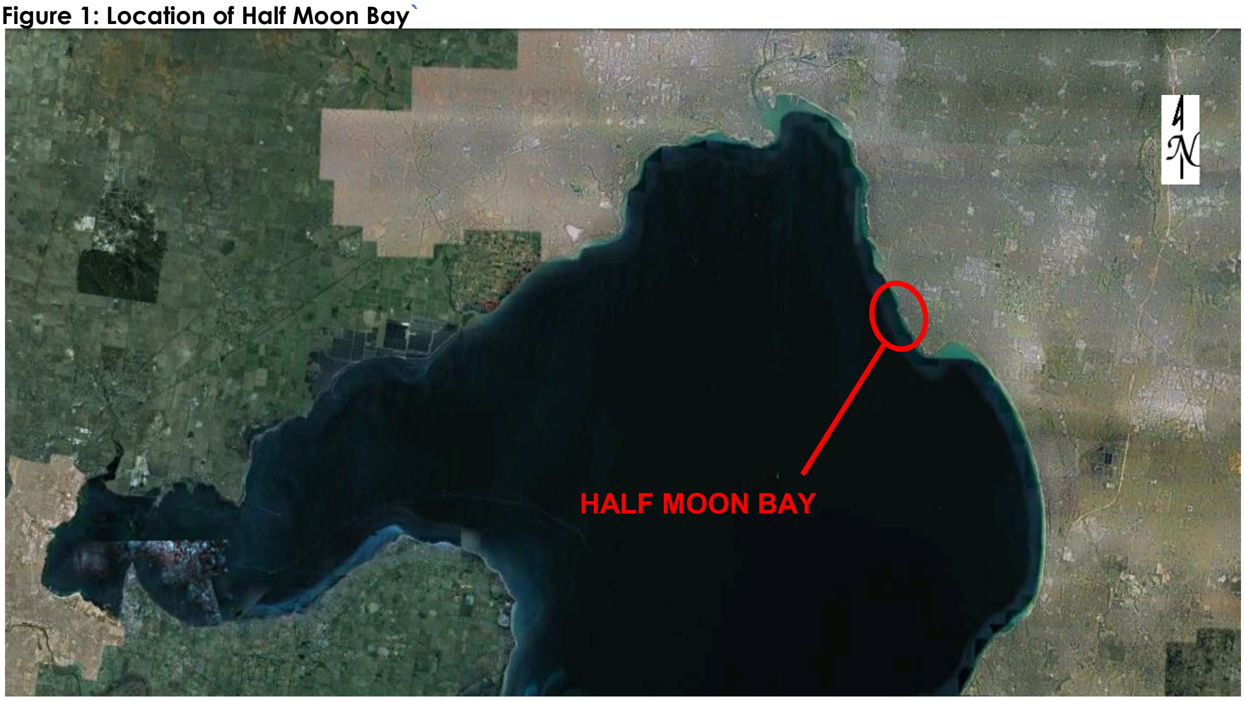
Oldfield Consulting Australasia has been engaged by the Department of Sustainability and Environment (the Department) in conjunction with Bayside City Council, to prepare a detailed design and technical documentation for tender purposes, for the renourishment of the beach at Half Moon Bay in Black Rock (Melway, 85, H2).

This renourishment project is part of the Victorian Government's *Enhancing Our Beaches* Program for delivering a range of beach nourishment projects around Port Phillip Bay.

This report provides all technical information relating to the detailed design of the renourishment. The design has been completed in accordance with the Project Specification, a copy of which is attached in **Appendix A**.

The project is located as shown in Figure 1.

Figure 1: Location of Half Moon Bay`



1.1 Project Objective

The primary objective of this project is to provide a wider beach at Half Moon Bay using beach nourishment with land-sourced sand, together with any stabilising structures which may be needed to retain the renourished beach in place.

2 Background

Half Moon Bay is a short (about 270 metres) west-facing beach which is an important recreational precinct for both the local and regional communities. The foreshore reserve is home to the Black Rock Yacht Club, the Black Rock Lifesaving Club, and the Cerberus café (refer Figure 2).

GHD's *Review of Beach Nourishment Priorities for Port Phillip Bay* (2008) recommended that the existing beach be widened with approximately 15,000 m^3 of sand to support the demands of beach users. The Sand Sourcing Contract which the Department currently has in place for the supply and placing of sand to a number of beach renourishment sites around Port Phillip Bay has allocated 10,000 m^3 of sand for Half Moon Bay.

Figures 3 shows the present state of the beach at Half Moon Bay, viewed from the south end of the beach.

Figure 2: Half Moon Bay

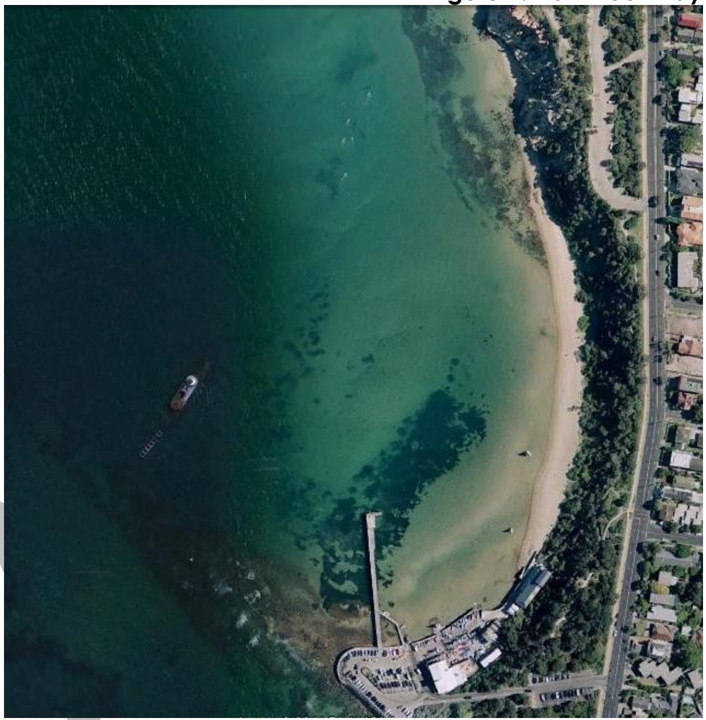


Figure 3: Half Moon Bay beach at mid-tide

3 Design Criteria

The design criteria for the detailed design of this beach nourishment are:

3.1 Beach Dimensions

Half Moon Bay beach presently varies in width from about 11 m to 16 m. Renourishment of the beach has been designed to widen the beach to at least 25 m wide, measured from the fence at the rear of the beach, to the high water mark (Mean High High Water, refer Table 1 below). The beach's length is 270 m, measured from the Life Saving Club beach access ramp at the south end to the northern end of the beach.

For calculating quantities of sand needed to renourish the beach and to determine the beach's existing profile, a level survey was conducted on 17 February 2011. Bathymetry of the bay offshore from the beach has been provided by Lidar data obtained by the Department in 2010.

3.2 Design Life

Twenty-five years has been adopted as the design life of the renourishment and associated works. This period has been selected on the basis of the guidelines provided in Section 6 of AS 4997 – Guidelines for the design of maritime structures. While this Standard applies primarily to engineering structures in the maritime environment (jetties, wharves, breakwaters, etc.) the guidelines can reasonably be applied to this project, taking into account the expected state of the beach at the end of this design life period. It would reasonably be expected that further renourishment of the beach would be required at the end of this design life.

3.3 Design Winds

Wind data collected at Fawkner Beacon was obtained from the Bureau of Meteorology covering the available data over the 19 year time period from March 1992 to February 2011. This location has been selected as representative of winds at and offshore of Half Moon Bay. Fawkner Beacon is located offshore about 9 km north-west of Half Moon Bay.

The wind data comprises measurements of wind speed and direction recorded every 30 minutes over the recording period of 19 years. This record is considered to be representative of wind climate for Half Moon Bay for the foreseeable future.

3.4 Design Water Levels

3.4.1 Tide

Astronomical tides at Half Moon Bay are expected to be similar to the tides at Sandringham Pier, located about 3 km north of Half Moon Bay. Tides at Sandringham Pier are shown in Table 1, extracted from the Australian National Tide Tables (2011).

Table 1: Tides at Sandringham Pier (Australian National Tide Tables, 2011)

State of Tide	Tide Level, m Chart Datum (CD)	Aust Height Datum (AHD)
Highest recorded tide (30/11/1934)	1.85 (Williamstown)	
Highest Astronomical Tide	1.1	0.6
Mean Higher High Water	1.0	0.5
Meal Lower High Water	0.6	0.1
Mean Sea Level	0.55	0.00
Mean Higher Low Water	0.5	-0.1
Mean Lower Low Water	0.2	-0.4
Lowest Astronomical Tide	0.1	-0.5
Lowest recorded tide (19/09/1926)	-0.36 (Williamstown)	

Mean Sea Level (MSL) is the average level of the sea surface over a long period and approximately coincides with +0.0 m Australian Height Datum, and has been used as the datum for tides and all levels.

3.5 Sea Level Rise

Future sea level rise due to climate change has been taken into account in accordance with the predictions provided in the *Victorian Coastal Strategy (2008)*. The predicted sea level rise over the next 25 years is 0.15m, based on the A1FI scenario adopted by the Victorian Government and detailed in Table 2.1 of *Climate Change – Risks to Australia's Coast,* Australian Government Department of Climate Change, 2009.

3.6 Storm Surge and Storm Tide

The term *storm tide* refers to coastal water levels resulting from the combined effects of astronomical tide and meteorological water level forcing. The meteorological component of the storm tide is commonly referred to as *storm surge* and collectively describes the variation in coastal water levels in response to atmospheric pressure fluctuations and wind setup.

Storm surge is a phenomenon which occurs only during severe weather events and results in a temporary raising of sea level caused by a combination of low atmospheric pressure and onshore wind. While storm surge is most severe during tropical cyclones in cyclone-prone areas, intense low-pressure systems in non-tropical areas can also result in storm surge. Climate change may result in increased storm intensities; however there are at present no clear guidelines on predicting this change.

Storm surge and storm tide along the Port Phillip Bay coastline has been estimated by CSIRO (McInnes, et al, 2009) as part of the Victorian Government's Future Coasts program. Predictions have been made for both the current climate conditions and for future sea level rise scenarios.

The estimates of storm surge and storm tide at Aspendale, located about 10 km south-east of Half Moon Bay, for the climate change scenario A1FI are shown in Table 2. These estimates can reasonably be applied to Half Moon Bay beach without adjustment.

Table 2 Storm surge and storm tide estimates

	Storm Surge[1], m			Storm Tide[2], m		
	2010	**2030**	**2070**	**2010**	**2030**	**2070**
ARI = 10 years	0.84	1.06	1.53	0.98	1.18	1.63
ARI = 100 years	0.94	1.17	1.65	1.14	1.39	1.83

Notes: ARI = Average Recurrence Interval
1. refer McInnes, et al, 2009, Table 5
2. refer McInnes, et al, 2009, Table 6

3.6.1 Design Water Level

For an ARI of 10 years, the design water level is estimated to be **+1.21m AHD**, to account for sea level rise (0.15 m) and storm surge up to 2030 (1.06 m).

3.7 Design Wave Height

Wave climate at Half Moon Bay comprises wind waves only. No swell waves contribute to the wave climate anywhere in Port Phillip Bay, except in the immediate vicinity of Port Phillip Heads. Wave heights have therefore been calculated using hindcasting techniques outlined in Part II, Chapter 2 of the Coastal Engineering Manual (2008).

3.7.1 Longshore transport wave climate

Significant wave heights in deep water have been estimated for a range of wind speeds from 5 to 65 km/hr, and the three directions of northwest, west and southwest. Table 3 shows the deep water significant wave heights (H_s) for each wind speed range and direction.

Table 3: Significant wave height for wind speed and direction

Wind speed km/hr	Wind speed m/sec	H_s (m) Wind direction SW	H_s (m) Wind direction W	H_s (m) Wind direction NW
5	1.4	0.10	0.10	0.10
15	4.2	0.30	0.22	0.15
25	6.9	0.55	0.50	0.30
35	9.7	0.60	0.70	0.50
45	12.5	0.60	0.80	0.70
55	15.3	0.60	0.90	0.80
65	18.1	0.60	1.30	1.00

The significant wave height from the southwest direction has been limited to 0.6 m because of the significant shoaling effect which the reef at the southern end of the bay will have in attenuating the incoming deep water wave.

The waves have then been reduced in height as applicable for shallow water effects, as the waves arrive at the Half Moon Bay beach.

These significant wave heights have been used in the calculation of longshore drift over a full average year of wave climate.

3.7.2 *Cross-shore wave climate*

For cross-shore sand movement in a storm event, a real storm recorded at Fawkner Beacon in December 1998 has been used to generate a deep water wave climate. Table 4 summarises the deep water wave climate for this storm.

Table 4: Westerly storm 25 – 27 December 1998

Time from start. hrs	Wind speed, m/sec	Hs, m	Time from start. hrs	Wind speed, m/sec	Hs, m	Time from start. hrs	Wind speed, m/sec	Hs, m	Time from start. hrs	Wind speed, m/sec	Hs, m
0.0	7.8	0.7	13.0	9.7	0.8	26.0	16.1	1.5	39.0	16.1	1.5
0.5	8.3	0.7	13.5	10.8	1.0	26.5	16.1	1.5	39.5	16.9	1.6
1.0	5.8	0.5	14.0	9.7	0.8	27.0	16.1	1.5	40.0	16.4	1.5
1.5	6.1	0.5	14.5	11.7	1.0	27.5	13.9	1.3	40.5	16.4	1.5
2.0	4.2	0.3	15.0	12.5	1.1	28.0	13.9	1.3	41.0	16.1	1.5
2.5	2.2	0.2	15.5	12.5	1.1	28.5	13.9	1.3	41.5	15.0	1.4
3.0	9.7	0.8	16.0	13.9	1.3	29.0	15.0	1.4	42.0	15.3	1.4
3.5	13.9	1.3	16.5	16.4	1.5	29.5	16.1	1.5	42.5	15.0	1.4
4.0	10.3	0.9	17.0	14.4	1.3	30.0	13.9	1.3	43.0	13.9	1.3
4.5	10.8	1.0	17.5	13.9	1.3	30.5	15.3	1.4	43.5	12.5	1.1
5.0	7.8	0.7	18.0	13.3	1.2	31.0	16.1	1.5	44.0	12.8	1.1
5.5	8.3	0.7	18.5	15.3	1.4	31.5	16.9	1.6	44.5	11.4	1.0
6.0	11.4	1.0	19.0	15.3	1.4	32.0	16.4	1.5	45.0	11.7	1.0
6.5	7.8	0.7	19.5	15.0	1.4	32.5	16.9	1.6	45.5	12.8	1.1
7.0	8.3	0.7	20.0	14.4	1.3	33.0	15.3	1.4	46.0	11.7	1.0
7.5	8.9	0.8	20.5	16.1	1.5	33.5	16.1	1.5	46.5	11.4	1.0
8.0	11.4	1.0	21.0	14.4	1.3	34.0	16.4	1.5	47.0	1.1	0.1
8.5	11.7	1.0	21.5	15.0	1.4	34.5	15.3	1.4	47.5	8.3	0.7
9.0	15.0	1.4	22.0	14.4	1.3	35.0	17.5	1.7	48.0	12.5	1.1
9.5	12.8	1.1	22.5	12.5	1.1	35.5	15.3	1.4	48.5	9.2	0.8
10.0	11.4	1.0	23.0	13.3	1.2	36.0	15.3	1.4	49.0	7.8	0.7
10.5	11.7	1.0	23.5	13.3	1.2	36.5	16.1	1.5	49.5	8.3	0.7
11.0	11.4	1.0	24.0	14.4	1.3	37.0	15.0	1.4	50.0	8.9	0.8
11.5	13.3	1.2	24.5	11.7	1.0	37.5	13.9	1.3	50.5	8.9	0.8
12.0	14.4	1.3	25.0	11.7	1.0	38.0	15.3	1.4	51.0	7.2	0.6
12.5	13.3	1.2	25.5	15.3	1.4	38.5	15.3	1.4	51.5	8.3	0.7

3.7.3 *Other modifying factors*

The HMVS Cerberus was placed in its current location about 300 m offshore from the Half Moon Bay beach (refer Figure 2) in 1926, to act as a breakwater.

However, considering the size of the wreck (69 m LOA), it is not considered to have any significant influence on the incoming wave climate, and its impact has been ignored for the purpose of this detailed design.

Type equation here.

4 Sand Transport

4.1 Longshore Transport

The seasonal longshore transport of sand up and down this beach has been determined using the IHE (Delft) Queens formula developed by Kamphuis (1998). This formula states the longshore sediment transport quantity as being:

$$S = \frac{1.3 \times 10^{-3}}{(1-p)\rho_s} \frac{\rho H_b^3}{T} \left[\frac{H_b}{L_o}\right]^{-1.25} \tan^{0.75}(\alpha) \left[\frac{H_b}{D_{50}}\right]^{0.25} \sin^{0.6} 2\varphi_b$$

where:

- S = longshore sediment transport (m^3/sec)
- ρ = density of seawater (kg/m^3)
- ρ_s = density of the sand (kg/m^3)
- p = porosity of the sand
- H_b = significant wave height at the breaking point (m)
- T = peak period of the wave spectrum (sec)
- D_{50} = median sand grain size (m)
- φ_b = wave angle to the seabed contours at breaking
- α = beach slope, and
- L_o = deep water wavelength (m).

The dominant waves causing longshore transport are from the southwest and the northwest. Sand is transported to the north by the southwest waves and to the south by the northwest waves. The westerly waves cause cross-shore sand movement which is discussed in the next Section.

The wave climate has been modified to account for refraction around the headlands at each end of the beach, resulting in a wave approach angle to the shore of 5°.

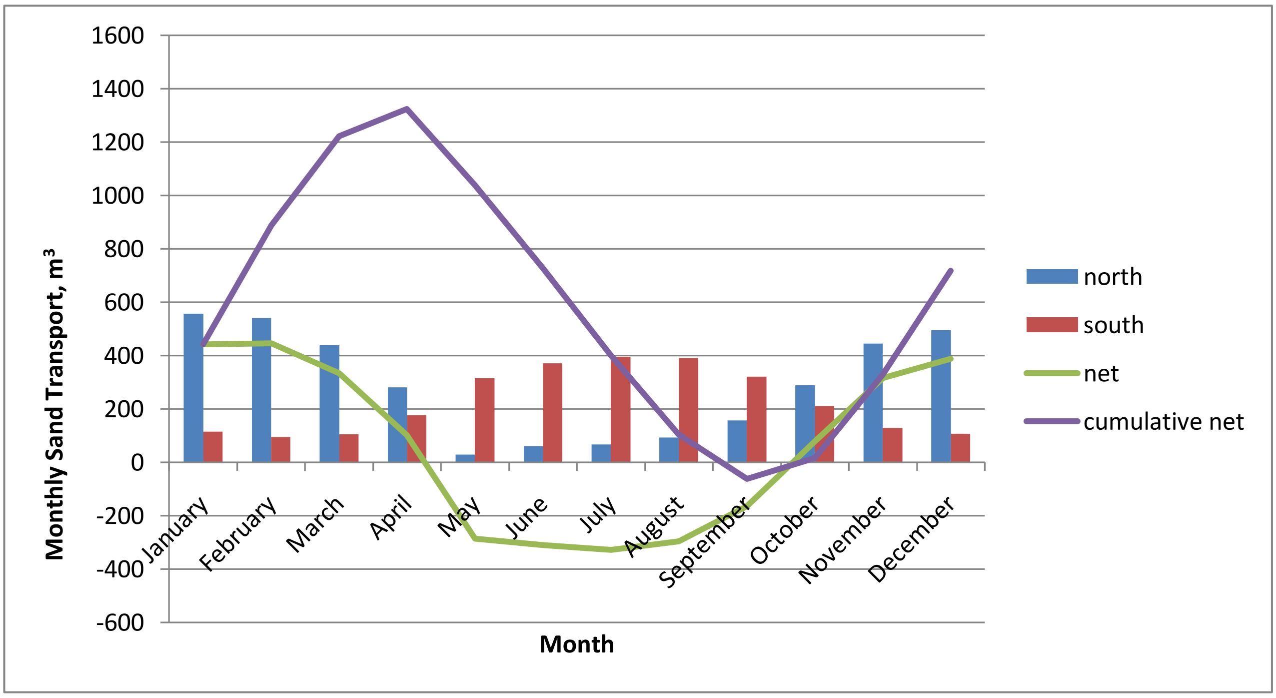
Longshore transport has been calculated for each month, based on the average proportion of the total time when winds come from the southwest and the northwest, over the 19 years of wind records. The net monthly transport volume is determined as the northerly quantity moved minus the southerly quantity moved. Table 5 shows the monthly sand movement quantities as well as the net quantity for each month.

Table 5: Longshore transport quantities, m³

Month	Wave direction (from) south-west	Wave direction (from) north-west	net	cumulative
January	557	115	442	442
February	541	95	446	888
March	438	104	334	1222
April	280	177	102	1324
May	29	315	-286	1038
June	61	371	-310	728
July	66	395	-329	399
August	94	390	-296	103
September	156	321	-165	-62
October	288	211	77	15
November	444	129	315	330
December	495	107	388	**718**
Annual total	**3450**	**2732**	**718**	

These quantities determined for each month have been presented in graphical form in Figure 4. The cumulative net transport quantity at the end of 12 months is 718 m³, which is the net annual quantity of sand moving north along this beach. This graph clearly

Figure 4: Longshore transport of sand



demonstrates the seasonal pattern of longshore drift, where the transport of sand in winter is towards the south while in summer the movement is to the north.

This net transport to the north is also consistent with previous estimates of longshore transport made for Sandringham beach (Vantree, 2002), and is also consistent with one year of sand transport monitoring at Sandringham beach (Worley Parsons, 2011).

This analysis is based on calculations which assume a long unrestrained beach where longshore transport of sand is free to occur without restriction. In the real situation at Half Moon Bay, the geometry of the bay and in particular the topography at the northern and southern ends of the bay will have a significant effect in restricting the volume of longshore transport actually moving along the beach. Red Bluff at the north end and Black Rock Point at the southern end will limit the longshore volume movement as these features act as terminating structures.

As a consequence of these geomorphic features, the actual quantities of sand moving beyond the beach will be significantly less than the quantities shown in Table 5. It is, however, difficult to calculate these quantities without complex numerical modelling of the site, which is not considered to be justified for this project.

4.2 Cross-shore Transport

Cross-shore transport of sand has been estimated using **SBEACH**, a software application developed by the US Army Corp of Engineers (USACE). Most cross-shore movement typically occurs during severe storms, with repair taking place during normal moderate wind and wave conditions.

Parameters for assessing cross-shore transport include:

- Wave height and period
- Water level
- Sand grain size
- Beach profile.

The new beach profile has been used in combination with a severe storm recorded on 25 to 27 December 1998 at Fawkner Beacon. This storm, lasting for 52 hours, caused substantial damage to yachts in the 1998 Sydney to Hobart Yacht Race, and was a severe westerly storm with significant impact at Half Moon Bay.

The storm details have been presented in Table 4. Wave hindcasting has been used to determine the deep water wave height and period developed during the storm, with a three-hour lead time to develop the wave climate across the 20 km fetch. The wind during this storm originated predominantly from the west, so a wave approach angle perpendicular to the beach has been adopted and no modification of the wave climate for refraction has been needed. Using linear wave theory, **SBEACH** then modifies the deep water wave height for shoaling effects as the wave approaches the shoreline.

Water levels used in **SBEACH** comprise a combination of the actual tide cycle during the storm, sea level rise and the storm surge predicted by McInnes (2009) in 2030.

The renourishment sand supply contract has advised that the sand to be supplied will have an average grain size of 1.1 mm, based on testing at the sand source.

The renourished beach profile has been developed to replicate, as near as practicable, the existing beach profile but with a shift offshore to provide a widening of the beach of about 15 metres. Assessment of cross-shore transport has been described in detail in the next Section.

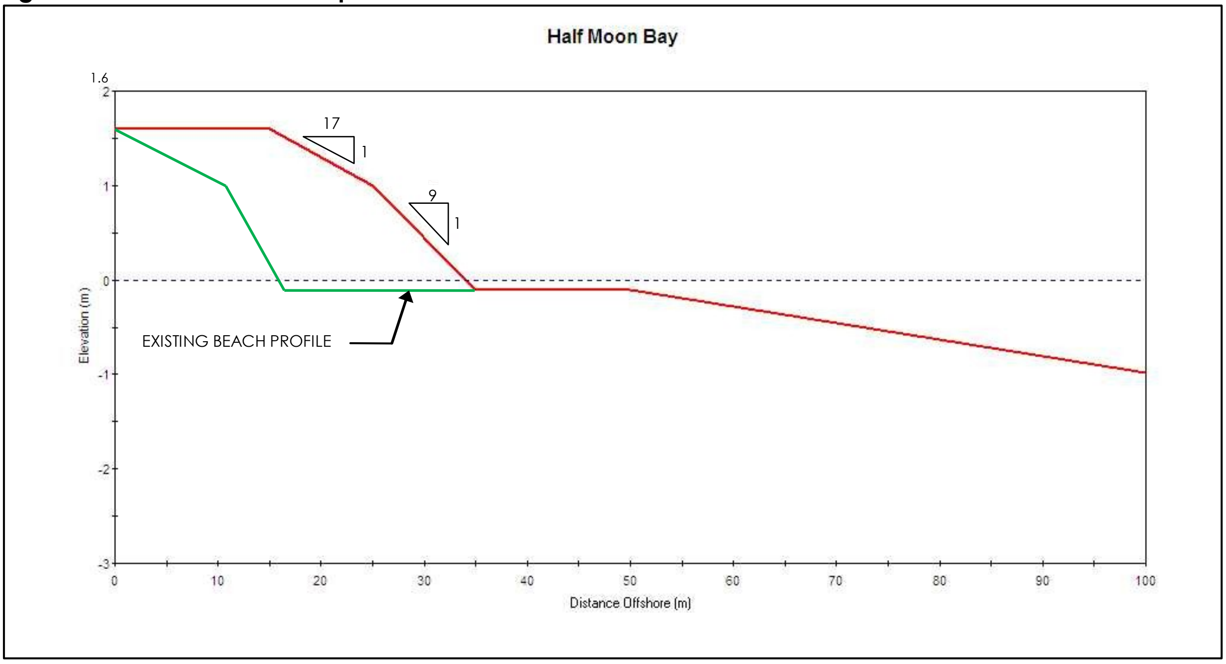
5 Design of the Renourishment

A renourished beach profile has been selected on the basis of the following criteria:

- The profile should be similar to the existing beach profile;
- The additional quantity of sand required for the new profile should be about 8,000 m^3;
- The beach should be about 15 m wider than it presently is;
- The new profile should be reasonably stable in the design storm;
- Sand loss from the beach from longshore transport should be limited so as not to remove the renourished sand quantity over the life of the new beach.

On this basis, the following profile (Figure 5) has been adopted. This profile also shows the existing typical beach profile as measured by the beach level survey.

Figure 5: Renourished beach profile



This profile will require **8,300 m^3** of imported sand, not including any construction losses. This quantity has been calculated using the level survey of the existing beach, together with Lidar bathymetry supplied by the Department.

This beach profile has been assessed for three sand grain sizes – 0.5 mm, 0.75 mm and 1.0 mm. Figures 6, 7 and 8 show the eroded profiles for these cases, as determined in **SBEACH**. From these cases, it is apparent that even sand of a finer grading will be reasonably stable across this profile, although the entire profile above MSL tends to flatten out to a shallower slope during the design storm. The case with 1.0 mm sand size, which corresponds to the average size of the intended imported sand will remain stable through this extreme storm event.

Figure 6: Eroded profile, 0.50 mm sand grain size

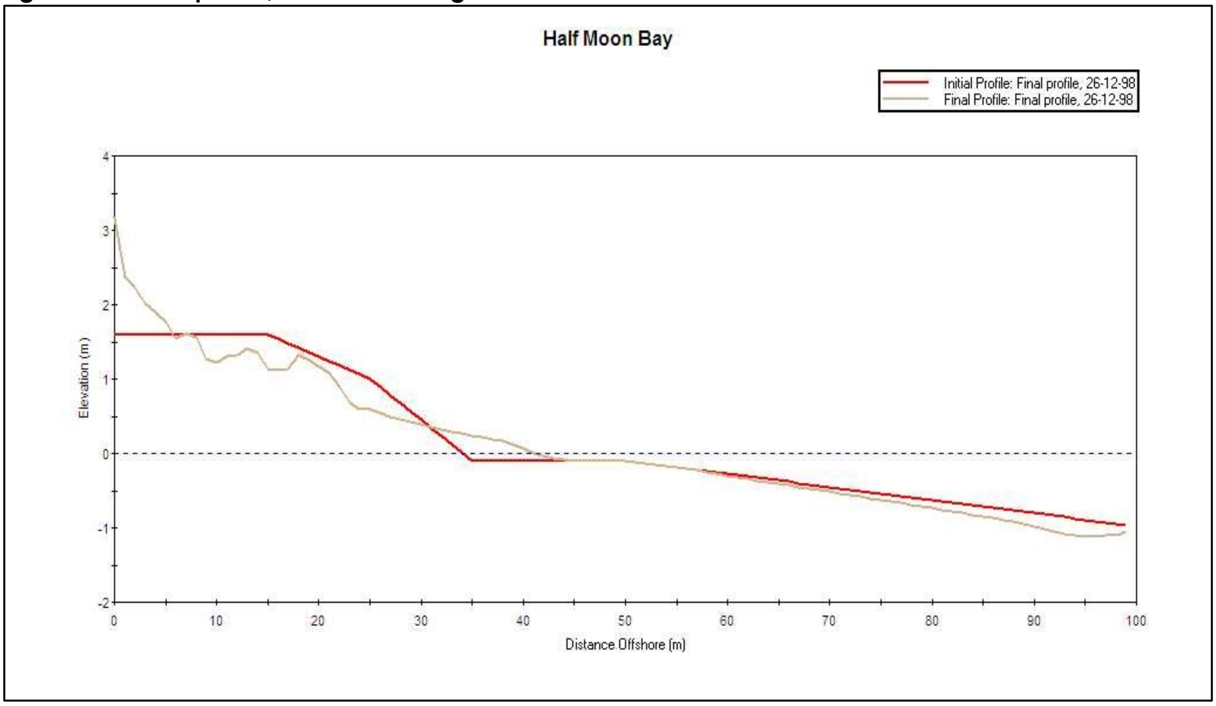


Figure 7: Eroded profile, 0.75 mm sand grain size

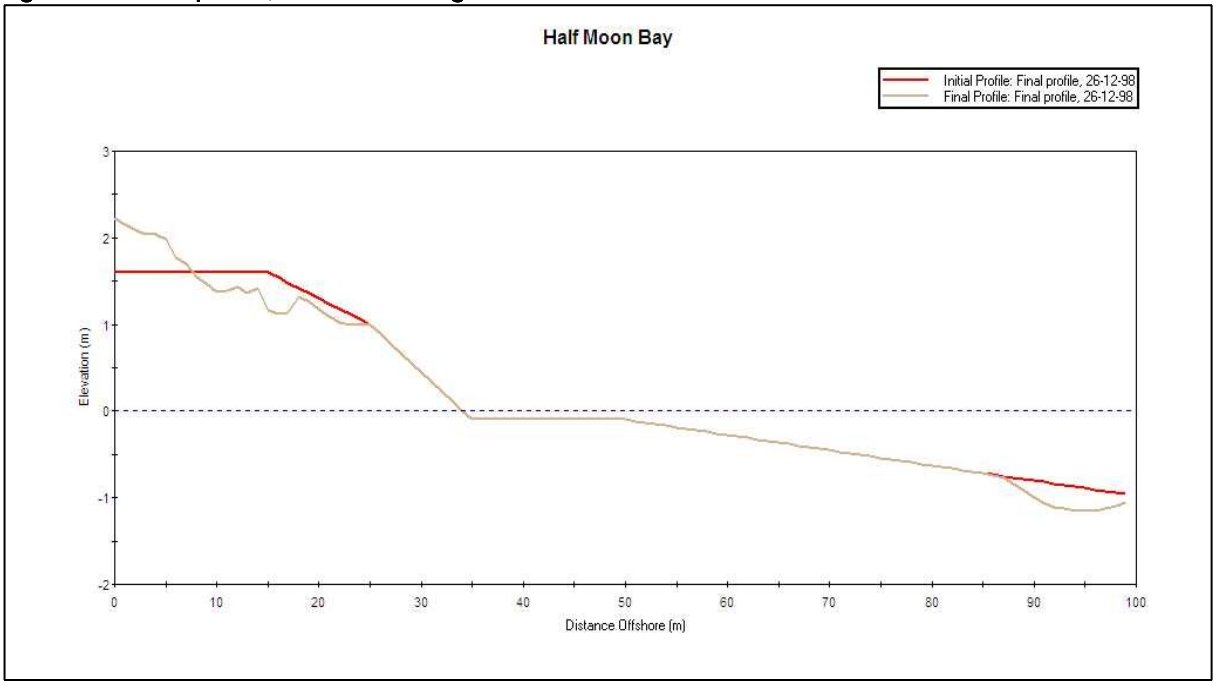
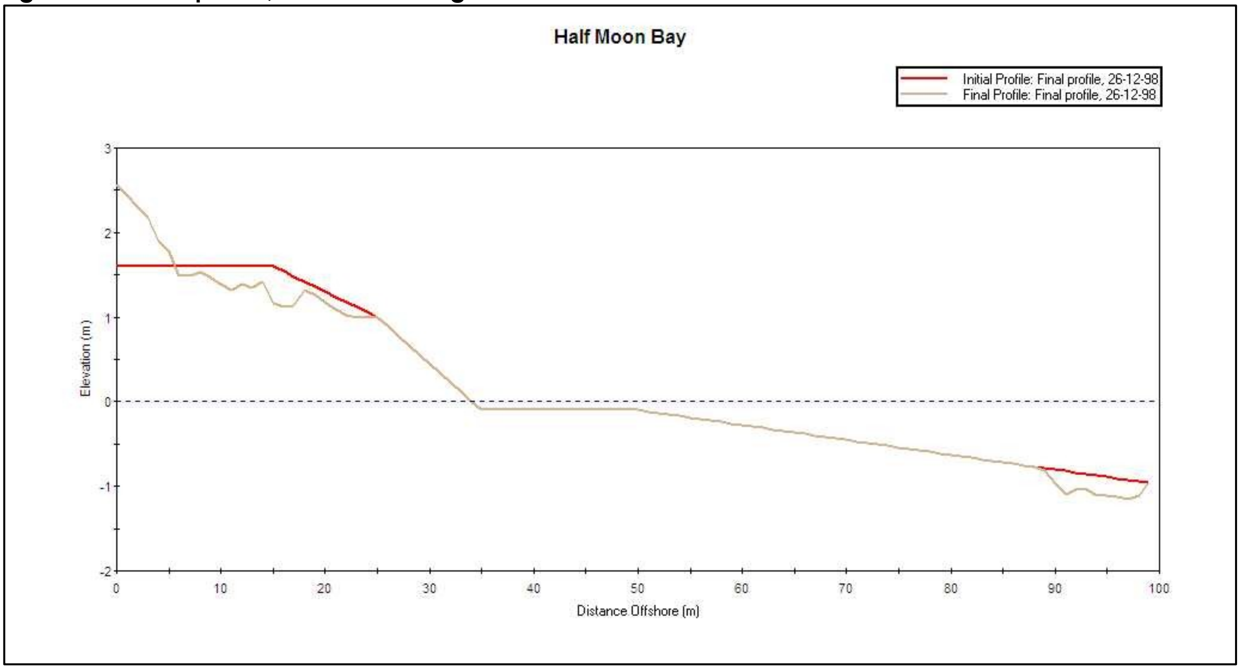


Figure 8: Eroded profile, 1.00 mm sand grain size



The estimated movement of sand across these beach profiles in this storm event are given in Table 6.

Table 6: Sand transport cross-shore

Sand grain size, mm	Quantity eroded, m^3/m	Total quantity eroded, m^3
0.5	10.8	2,900
0.75	6.1	1,650
1.0	6.5	1,750

These modified profiles are to be expected, where the finer sand will tend to approach a typical concave equilibrium profile, while the coarser the sand, the less the movement across the beach profile. For all cases, some sand is also moved further up the beach towards the fence at the back of the beach.

The other point to note with this profile is the minimal loss of sand from the beach to deeper water offshore, even for the fine sand. This means that for severe storm events, the sand placed into the renourishment profile will tend to remain within the foreshore limits, from where it will gradually re-deposit onto the beach in a stable quasi-equilibrium profile.

This analysis shows that the selected profile is satisfactory for this beach, as it is expected to remain relatively undamaged under the effects of an extreme storm event.

6 Other Design Components

6.1 Anchorage Structures

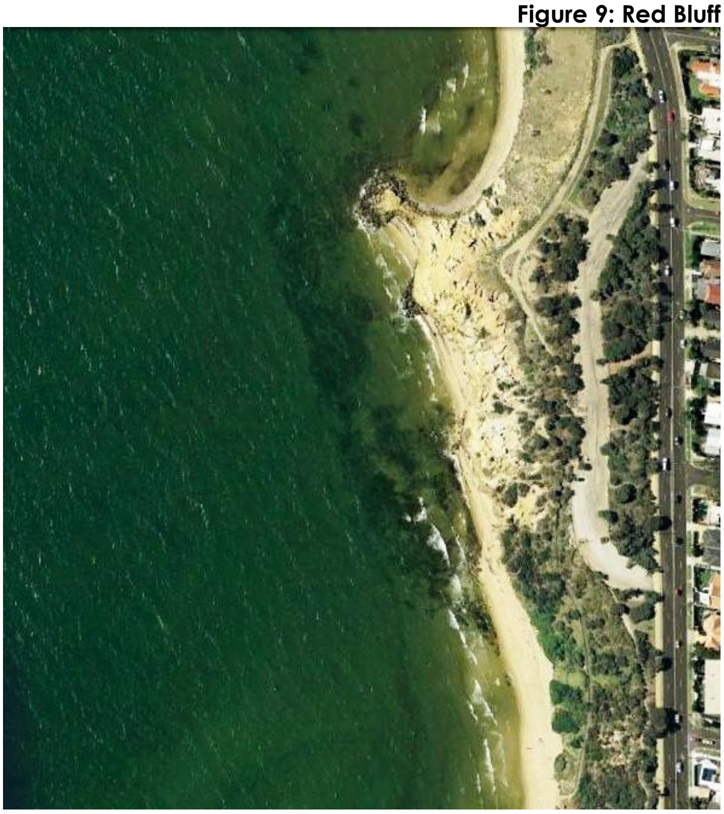
6.1.1 Site topographical modifiers

Analysis of longshore sediment transport in Section 4.1 above confirms that net transport is in the northerly direction for this site. A net transport volume of about 700 m³ per year has been calculated. However, this calculation does not take into account any topographical features along the Half Moon Bay beach which are expected to significantly reduce this longshore movement below the calculated quantities.

At the north end of the beach, Red Bluff is a very prominent topographical feature which will act as a natural groyne structure in reducing the sand transport quantity from the beach. Figure 9 shows an aerial view of Red Bluff and its influence on the beach.

This rocky outcrop will act as a natural anchoring structure to reduce the volume of sand being transported north from the Half Moon Bay beach. Consequently, an artificial anchoring structure is not considered necessary at the northern end of the beach.

Figure 9: Red Bluff

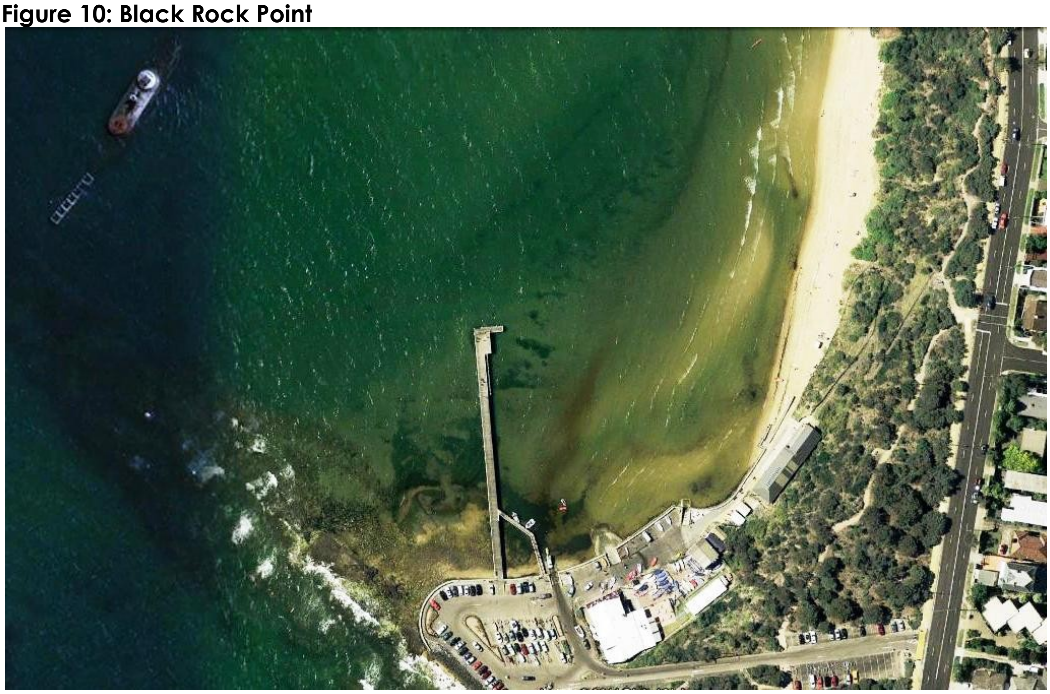


6.1.2 Southern end of the beach

The longshore sand transport analysis in Section 4.1 shows that there is some transport of sand to the south during the winter months (April to September), amounting to about 1,800 m³ on average per year. While this volume of sand amounts to about 20% of the total 8,000 m³ volume of sand proposed for the renourishment, the longshore analysis shows that this southerly transport will be more than compensated by the northerly movement during the summer months. Furthermore, Black Rock Point (shown in Figure 10) acts in a similar way to Red Bluff as a natural anchoring structure to reduce sand transport volume to the south. Although the aerial photo shows some sand in the southern part of the bay around the jetty and boat ramps, it is highly unlikely that any sand is transported beyond the rocky outcrop and reef west of the car park.

On the basis that the net longshore sand transport is to the north, and the Black Rock Point and reef will help to mitigate southerly longshore transport, it is considered that there is no justification for providing an anchorage structure at the southern end of the beach.

Figure 10: Black Rock Point



6.2 Other Impacts from Beach Renourishment

It is also noted that a regular dredging campaign is conducted by the Bayside City Council to maintain adequate depth at the public boat ramp located adjacent to the jetty at the very southern end of Half Moon Bay. The indirect benefit of this dredging campaign is the regular redistribution of the dredged sand onto the Half Moon Bay beach. It is understood this dredging contributes about 400 m^3 of dredged sand deposited onto the beach every year.

The renourished and widened beach is expected to exhibit very similar cross-shore and longshore sand transport characteristics as the existing beach, because the profile of the new beach is similar to the existing beach. Accordingly, it is expected that the quantities of sand transported off the beach will be similar to the current pattern. It is therefore likely that the quantity of sand deposited at the boat ramp, requiring dredging within the Bayside Council's annual dredging campaign will be the same as currently dredged.

7 Conclusions

The findings of the detailed design for the renourishment of the Half Moon Bay beach are:

1. The beach can be widened by about 15 metres, using about 8,300 m^3 of imported sand sourced from a land-based source;
2. Net longshore transport of sand is typically towards the north, amounting to about 700 m^3 per year, which is naturally anchored by Red Bluff;
3. Anchorage structures are not required to terminate the northern or the southern ends of the renourished beach;
4. A beach profile similar to the existing beach profile will be stable during a severe storm event;
5. The selected profile is expected to remain stable for the design life of the project, although longshore transport of sand to the north may deplete the renourished beach by a small amount, which is unquantifiable. It may be necessary to renourish this beach again at the end of the 25 year design life;
6. The use of imported sand from a land-based source, with a mean grain size of 1.1 mm will be satisfactory for renourishing this beach;
7. There will be no change in the requirements for dredging at the boat ramp as a consequence of this beach renourishment.

8 References

Royal Avenue Foreshore Protection, Vantree for the Department of Sustainability and Environment, January 2002;

Coastal Engineering Manual, Manual 1110-2-1100, US Army Corp of Engineers, 2002 – 2006;

Review of Beach Nourishment - Priorities for Port Phillip Bay, GHD for the Department of Sustainability and Environment, April 2008;

Victorian Coastal Strategy, Victorian Coastal Council, 2008

Climate Change – Risks to Australia's Coast, Department of Climate Change, 2009;

The Effects of Climate Change on Extreme Sea Levels in Port Phillip Bay, McInnes, K, O'Grady, J and Macadam, I, CSIRO, November 2009;

Australian National Tide Tables, Australian Hydrographic Service,2011;

Royal Ave Sand Monitoring, Interim Report, Worley Parsons for the Department of Sustainability and Environment, January 2011.

APPENDIX A
Project Specification

1. SCOPE OF REQUIRED SERVICES

The Department of Sustainability and Environment (DSE) has been provided with funding from the Enhancing Our Beaches Program to design a renourishment for the beach at Half Moon Bay, Black Rock and requires the services of a duly qualified coastal engineering contractor.

The primary focus of the Contractor's role is to:

1) Analyse the existing conditions at Half Moon Bay – including coastal processes existing coastal reports and historical aerial photos to determine lateral sand movement and net annual sand losses/gains;
2) Survey and map the existing features of the beach and surrounds (including existing services and drainage assets);
3) Attend 3 stakeholder information sessions to inform about the project and establish any concerns with preliminary designs. Where practicable, the stakeholders concerns should be taken into consideration during the final design phase of the project;
4) Prepare a report on the existing conditions, results of studies and stakeholder issues;
5) Design the best possible beach renourishment and associated structures ("the works") to create a viable long term, low maintenance asset, given the allocated project budget, existing conditions and stakeholder issues;
6) Prepare as constructed drawings, design plans, bill of quantities and specifications to enable the construction of the works;

2. BACKGROUND

Half Moon Bay is an active harbour and an important recreational precinct for Melbournians, tourists and the wider community. The foreshore reserve is home to the Black Rock Yacht Club, Black Rock Life Saving Club, and the Cerberus cafe.

Half Moon Bay is classified Crown land and is the responsibility of DSE on behalf of the Victorian Government. Bayside City Council is the delegated Committee of Management (CoM) and is responsible for the day to day management operations of the beach.

In April 2008 an assessment of the environmental, social and economic values of Port Phillip Bays high use beaches was undertaken by GHD (Appendix A) to determine the priority for renourishment works[1]. The report established that there was a significant loss of sand along sections of the Port Phillip coastline (including Half Moon Bay) as a result of recent storm damage .The report concluded that the renourishment of Half Moon Bay beach should be undertaken as a priority.

DSE has been allocated approximately $500,000 by the Victorian Government to renourish the beach. The works are required to be completed by September 2011 and all construction activity must occur during June 2011 to September 2011. No construction will be permitted during the summer months due to potential public safety and amenity concerns.

The design for the beach renourishment works must also consider the use of appropriate soft and

[1] GHD AUSTRALIA 2008 - "Review of Beach Nourishment - Priorities for Port Phillip Bay"

hard engineering structures to mitigate erosion and to protect the existing coastal features including the boat ramps, the harbour, the masonry wall, cliffs and existing vegetation and the historic warship HMAS Cerberus.

The key stakeholders that are to be engaged during the design phase of this project are DSE, Parks Victoria, Bayside City Council, Black Rock and Sandringham Conservation Association, Aboriginal Affairs Victoria, Sandringham Foreshore Association, Black Rock Yacht Club, Black Rock Surf Life Saving Club, and Cerberus foreshore café.

3. OTHER RESOURCE DOCUMENTS

Review of Beach Renourishment Priorities for Port Phillip Bay- GHD Pty Ltd, April 2008

This report provides a technical and social basis for assessing and prioritising the allocation of funding provided by the Victorian Government in its announced Enhancing Our Beaches Program.

Beach Renourishment Preliminary Designs - Coastal Engineering Solutions Pty Ltd, January 2003

This is a four volume study that addressed the renourishment of a number of beaches around Port Phillip Bay; Altona Beach, Mentone Beach, New Street and Elwood Beaches and the Corio Bay Beaches. These were some of the 26 beaches identified for renourishment in the "Beaches at Risk Study" Vantree (2001).

Beach at Risk Study - Vantree 2001

This study is a comprehensive review of 26 beaches around Port Phillip Bay. The report provided the basis for Government to build the Enhancing Our Beaches and Protecting Our Bays initiatives.

Sand supply contract

DSE has entered into a contract with Gippsland Premium Quarries Pty Ltd for the supply of sand to this project (Refer Appendix B). The beach design must incorporate sand utilising this sand supply contract.

Copies of these reports are available for inspection by prior arrangement at the Box Hill DSE office.

4. MANAGEMENT AND REPORTING REQUIREMENTS

DSE's Infrastructure and Risk Management Group is the project principal and will:

- Appoint contractors to the project;
- Manage the project scope, deliverables, plans and budget;
- Approve any changes to the project scope, deliverables or variations to the construction program;
- Obtain all approvals required under the Environmental Effects Act 1978, the Planning and Environment Act 1987 and the Coastal Management Act 1995;
- Provide information, brief and seek input from any key stakeholders, Committee of Management, Project Group or Steering Committee;
- Co-ordinate community information sessions, including engaging the local community, key stakeholders, local interest groups and Committee of Management;
- Prepare and manage communication for local media;

The Service Provider must comply with the requirements of the provision of general services agreement (draft) and provide the Services to a standard that reaches or

exceeds the Service Levels set out in Schedule 1. In addition, the Service Provider must:

- provide the Services to the reasonable satisfaction of the Department and in a proper, timely and efficient manner using that standard of care, skill, diligence, prudence and foresight that would reasonably be expected from an experienced service provider.
- ensure the highest quality of work and the delivery of the Services with the utmost efficiency;
- act in good faith and in the best interests of the Department;
- comply with all statements or representations as to its performance or the provision of the Services set out in the Tender Documents; and
- keep the Department informed of all matters of which it ought reasonably be made aware and provide such information in relation to the provision of the Services as may reasonably be required by the Department.
- provide any and all equipment (including computer hardware or software and any ancillary support) necessary for the performance of the Services

Meetings and site visits with the contractor and DSE will be held regularly to provide updates, identify issues, confirm time frames and assess progress.

It may also be necessary to meet with local councils and CoM to keep them informed and involved. These meetings will be arranged by the project manager on an as needs basis.

Any matters which arise that may be deemed to materially affect the development of the project should be communicated to the Department Project Manager within twenty-four (24) hours of the matter being known to the contractor.

Permits and approvals

The contractor is not required to secure any approvals that may be required under the Environment Effects Act 1978, the Coastal Management Act 1995, Aboriginal Heritage Act 2006 and the Planning and Environment Act 1987.

5. COMMUNITY CONSULTATION

It is important the local community are kept informed of the beach renourishments in their local area and community information sessions will be conducted on an as needs basis. These meetings will be arranged and managed by the DSE project officer and CoM. The contractor will be expected to attend these meetings and provide technical advice about the beach design (see Schedule 1).

6. OTHER CONSIDERATIONS AND DELIVERABLES

Climate change considerations

It is considered coastal and foreshore protection assets will be subject to the increasing forces of nature due to climate change. Sea levels are predicted to rise 0.8m by the end of the century and storm surges are expected to increase in intensity and frequency. The impact on condition and performance of beaches around Port Phillip Bay, as a result of this change, is unknown and DSE seeks to take preliminary advice.

The contractor will need to clearly demonstrate in the beach profile and infrastructure designs the ability to cope with our changing climatic conditions including rainfall, wind patterns and frequency and severity of extreme weather events over the design lifetime of each project.

Drawings and specifications

The contractor should allow for design drawings and specifications to be provided in electronic format. Hardcopy drawings will be required for discussion purposes at Project Group meetings.

7. CONDITIONS OF ENGAGEMENT

DSE Agreement for the provision of General services (Single Purchase) (see Attachment 1)

8. FURTHER INFORMATION / RELATIONSHIP MANAGEMENT

Sally Patterson
Senior Project Officer
Public Land Services
30 Prospect Street
Box Hill VIC 3128

Email: sally.patterson@dse.vic.gov.au
Phone: 03 9296 4503

Clarification questions may be submitted in writing (by email). A written response to questions will be circulated to all parties.

9. SERVICE HOURS

The hours during which the contractor shall normally provide the services to the Department are:
8.30am to 5pm Melbourne local time
Monday to Friday
Public Holidays excluded

10. INSURANCE

Pursuant to the attached terms and conditions, the insurance shall be no less than $10 million for Professional Indemnity (PI) and $20 Million for Public Liability (PL).

11. PRICING

DSE requests an hourly fee for work done on these projects and any updated information on staff and company insurances.

12. OTHER EXPENSES

The department will meet travel expenses, including accommodation, incurred by the contractor in the performance of the Services. Flights and accommodation are to be managed through the Whole of Government contract for Travel Services.

The contractor is to detail proposed travel and related expenses in Table 2 – Travel and Other Expenses attached.

13. SUBMISSION

You are invited to make an offer using the Request for Quote form. The Quote should include:

- Company details including legal name, trading name, address, ABN and contact details
- The names of any personnel who would be assigned to the project, and briefly their roles and responsibilities, qualifications, and other professional experience relevant to the conduct of this study.

- Your experience relative to the project services.
- Declaration of any conflict of interest and how any conflict of interest may be managed.
- Details of your professional insurance arrangement, eg professional indemnity
- Any other relevant information.

Submissions are due by COB 27 January 2010 and should be emailed to sally.patterson@dse.vic.gov.au

14. SELECTION CRITERIA

The selection criteria for this project are:

- Experience and qualifications of personnel;
- Skill and knowledge of coastal engineering and management techniques;
- Past performance in providing similar services to DSE
- Proposed methodology; and
- Project Cost.

APPENDIX B
Drawings Issued for Tender

Oldfield Consulting Australasia Pty Ltd **ABN 43 609 857 502**

PO Box 7060
Hawthorn North, Victoria 3122
T: +61 (0) 419 795 054 E: doug@oldfieldconsulting.com.au

Document Status

Rev No.	Author	Approved for Issue		
		Name	Signature	Date
A	D O Oldfield	D O Oldfield	[signed]	1 June 2011
B	D O Oldfield	D O Oldfield		29 June 2011

Job No. 11101