

5 Description of the Affected Environment

5.1 Biophysical Environment

5.1.1 Climate

The Cape Peninsula has a Mediterranean climate with well-defined seasons. The complex system of folded mountains which dominate the coastal plains of the Cape Peninsula, is the main physical feature which impacts the prevailing weather systems.

Winter months extend from May to August and are considered mild, with a July average maximum temperature of 18°C and average minimum temperature of 7°C. The Western Cape is a winter rainfall area, with occasional rain during the summer season. Rain during this time is a result of large cold fronts originating over the south Atlantic Ocean which approach Cape Town from the northeast.

Strong northerly and north-westerly winds, which may reach gale force, generally accompany these cold fronts. Due to the varied topography of the peninsula, average rainfall in particular places can vary between 600 mm and 2 500 mm per year.

The average daily temperatures and rainfall figures for the Cape Peninsula during the winter months are provided in Table 5-1.

Table 5-1: Average temperatures and rainfall during winter

Month	Average Daily Max Temperature (°C)	Average Daily Min Temperature (°C)	Average Monthly Rainfall (mm)
May	20	9	69
June	18	8	93
July	18	7	82
August	18	8	77

Summer in Cape Town extends from November to March and is characterised by warm and dry conditions. The average January minimum temperature is 16°C and the average maximum temperature is 26°C, with strong South Easterly winds occurring throughout the season, often blowing continuously for several days. The South Atlantic high pressure cell which is situated off the south coast during this period, causes these wind conditions, which can exceed 30km/hr for more than 20% of the time.

The average daily temperatures and rainfall figures for the Cape Peninsula during the winter months are provided in Table 5-2.

Table 5-2: Average temperatures and rainfall during summer

Month	Average Daily Max Temperature (°C)	Average Daily Min Temperature (°C)	Average Monthly Rainfall (mm)
November	24	13	14
December	25	15	17
January	26	16	15
February	27	16	17

5.1.2 Geology

Table Bay

Table Bay is a log spiral bay anchored by rocky headlands at Mouille Point in the south and Blouberg in the north. The bay contains Robben Island and the economically important Port of Cape Town. The maximum water depth in the centre of the bay is approximately 35 m, increasing to 70–80 m outside of a line between Mouille Point and the western shores of Robben Island (Figure 5-1) (Lwandle, 2006).

The seabed is mainly covered by thin layers of sand but has areas of partly exposed bedrock. Fine sand is generally confined to the eastern nearshore region between Blouberg and the harbour. However, a tongue of fine sediments extends from the nearshore zone seaward to a depth of approximately 25 m between Table View and Rietvlei. Smaller pockets of fine sand are found at the bay entrance and on the eastern shore of Robben Island. Medium coarse sand covers the remaining areas of Table Bay, as indicated in Figure 5-2 (Lwandle, 2006).

The major sources of the sand in Table Bay are seasonal (mainly winter) inputs from the Diep and Salt Rivers and local erosion of Malmesbury shales. There is no substantial sediment supply to the bay from longshore transport from the south. Sediment is transported out of Table Bay by local wave and storm driven transport. The overall residence time for surficial sediments is estimated at 2-3 years (Lwandle, 2006).

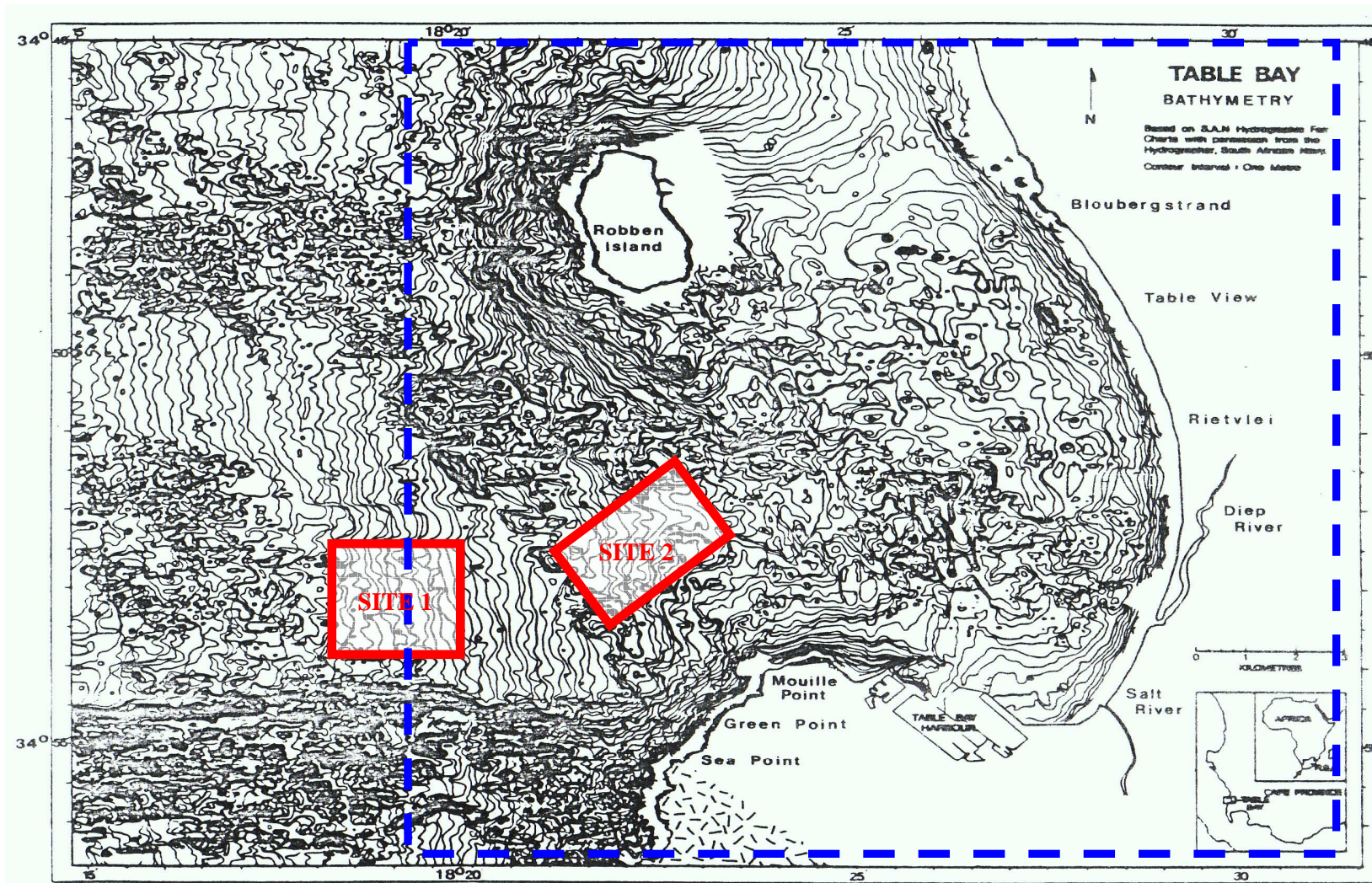


Figure 5-1: Bathymetry of Table Bay

Source: Lwandle, 2006a

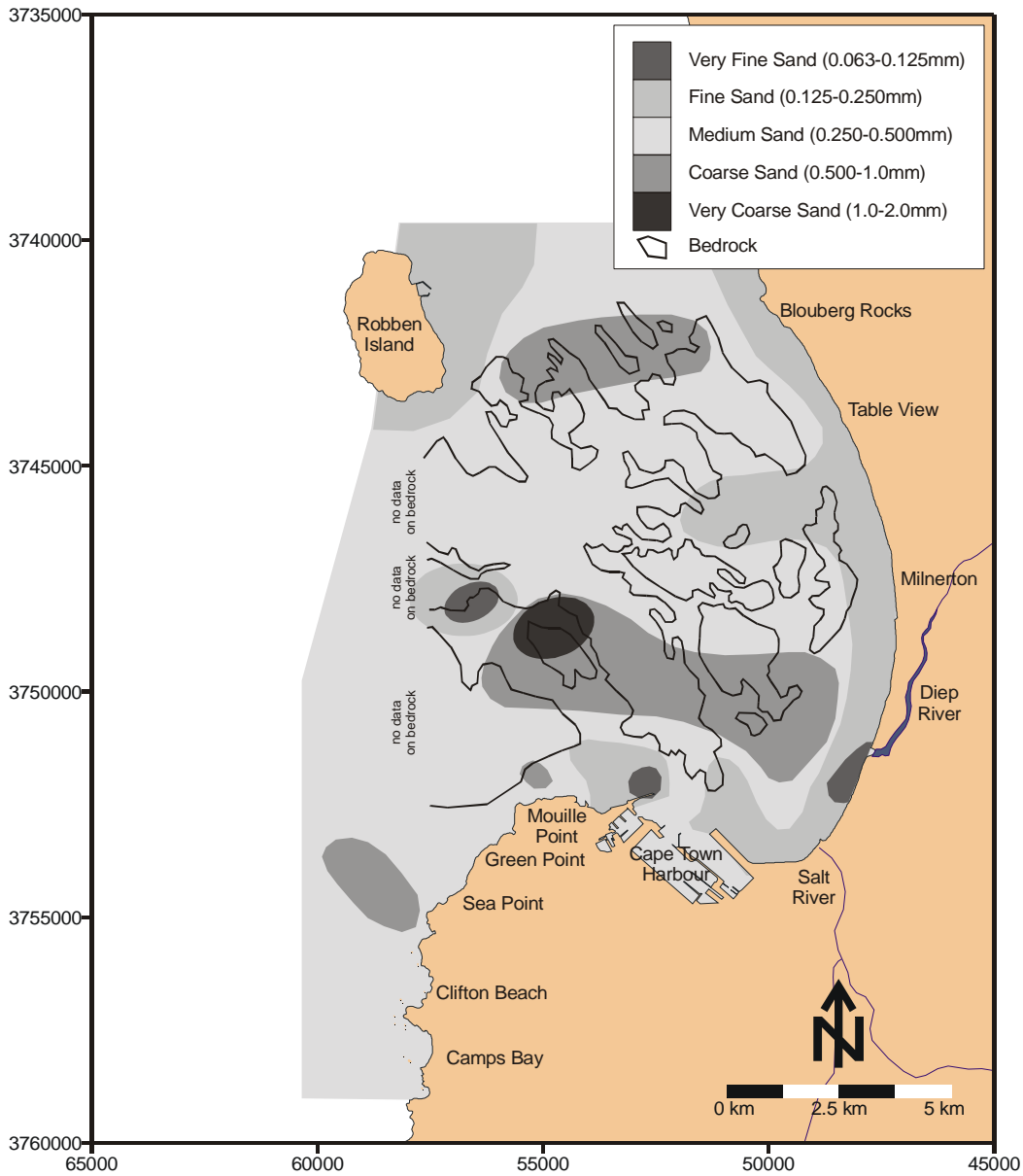


Figure 5-2: Sediment and Bedrock Distribution in Table Bay

Source: Lwandle, 2006a

The shoreline of Table Bay (see Figure 5-3) from Blouberg to Mouille Point consists of 3 km of rocky shore (at Blouberg and at Mouille Point), 13 km of sandy beach (between Blouberg and Table Bay harbour) and 4 km of artificial shore protection and breakwaters comprising the Port of Cape Town. Robben Island has a total shoreline of 9 km, of which 91% is rocky (Lwandle, 2006).

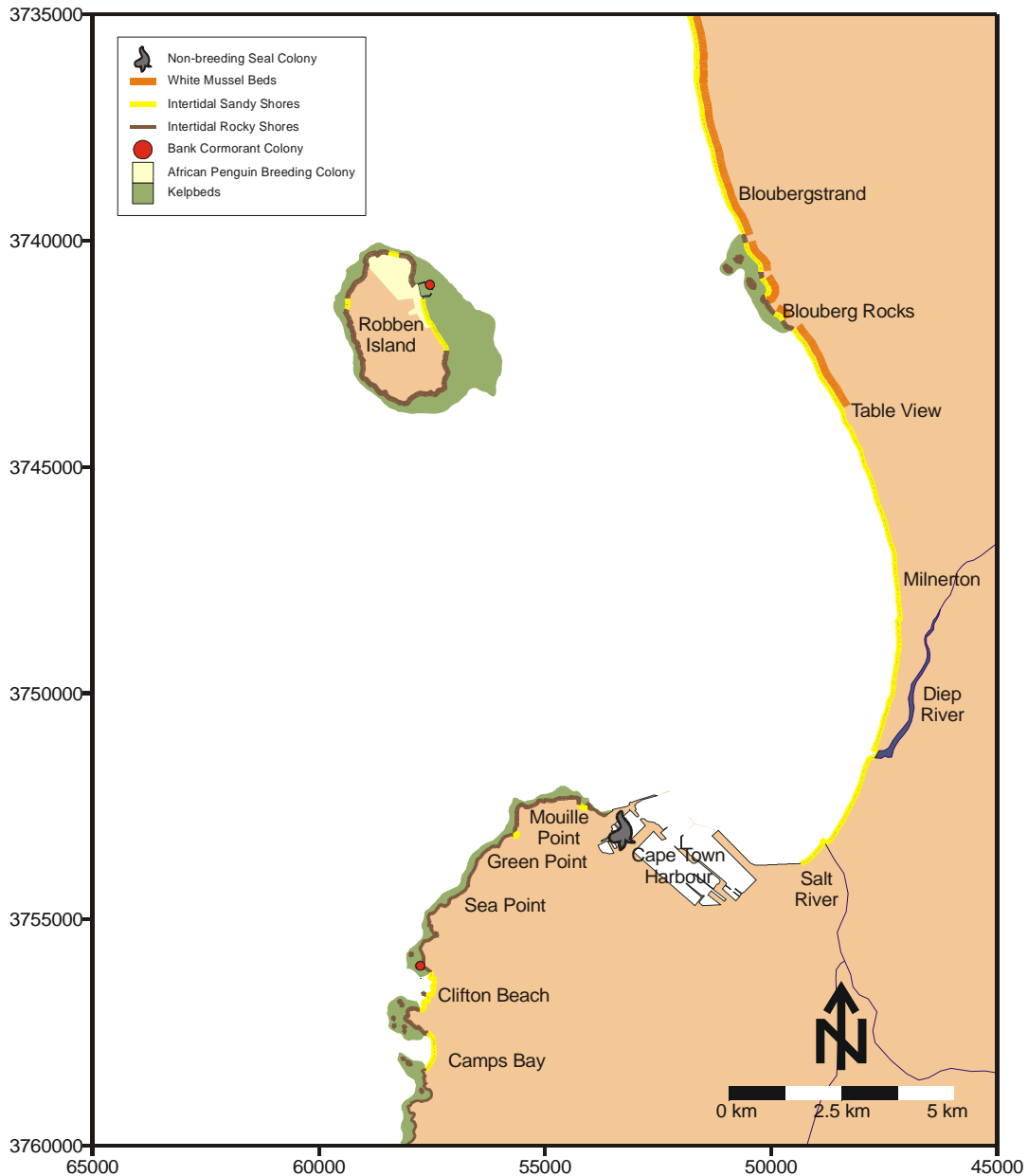


Figure 5-3: Shoreline features and key faunal populations in Table Bay

Source: Lwandle, 2006a

Port of Cape Town

The current depth of the Ben Schoeman Basin varies between 10 m below CD in the eastern part of the basin near Berth 600 and 15 m below CD. Surficial sediments comprise:

- Dark grey, very loose to loose silty sand (equivalent spherical diameter particle size range <math><2.00\text{mm} - > 0.063\text{mm}</math>); and
- Dark grey to black, soft sandy silt sediments, mainly mud (<math>< 0.063 \text{ mm}</math>) with a small component of gravels (> 2.00 mm).

The distribution varies throughout the dock basin, but the average composition is 43% – 50% sand, 21% – 44% mud and 5% – 19% gravel. The thickness of these sediments is typically 1 to 2 m (CSIR,

2006a). The presence of mud, silt and clay sized particles in the surficial sediments indicates that areas within the Ben Schoeman Dock basin are depositional in nature. This is expected, as harbours are usually located in quiet water areas so that shear stresses at the sea bed would be low, allowing fine material to deposit on the seabed. The variable thickness of the surficial sediment layer may be attributable to previous dredging and construction activities that altered the depth of the coarser material underlying the surficial sediments. Initial construction activities associated with the Ben Schoeman Dock occurred in the early 1970s, so that sediments would have been accumulating then (CSIR, 2006a).

The material underlying the surficial sediments consists of:

- Very stiff silt and sandy silt from residual greywacke and shale of the Tygerberg Formation; and
- Very soft rock to hard rock shale and greywacke at depths ranging from 0.3 m to 7.05 m below the seabed (CSIR, 2006a). Rock covers approximately 35,000 m² in the south-eastern corner of the Ben Schoeman Dock.

Proposed Disposal Sites

Two potential sites for the disposal of dredge material were identified during this study. On the basis of a side-sonar scan conducted in August 2006, a high resolution bathymetry chart and sampling results it was established that **Site 1** is covered by sediment rather than rock. The sediment consists predominantly of sand with an admixture of mud. The variability of sampled sediment across the site is low, indicating that this site is relatively uniform. The seafloor becomes rocky to the west and sandy to the north-west of Site 1 (CSIR, 2006a; CSIR, 2006b).

Site 2 consists of a small patch of sand surrounded by rocky reefs (CSIR, 2006b). Sediments consist predominantly of sand. Compared to Site 1 there is very little mud at Site 2 but a higher proportion of gravel-sized particles. Variability of sampled sediments across the site was high, indicating that the composition of the seafloor at Site 2 is less uniform than at Site 1. Ripples on the seabed also suggest a higher degree of sediment mobility at Site 2 (CSIR, 2006a).

Trace metal concentrations in sediments measured at both sites are low and well within accepted thresholds. Sediment samples at Site 1 show higher trace metal concentrations than those at Site 2, which may be attributed to the presence of clay minerals at Site 1. The trace metals appear to be lithogenic in origin and may be representative of natural background concentrations in the geological setting of Table Bay (CSIR, 2006a).

5.1.3 Oceanography

Table Bay is located within the southern Benguela upwelling system and its circulation and water properties are characteristic of the region. Water movement within the bay is primarily wind-driven, with shelf currents further offshore and tides playing a minor role. Wave-driven flows have an important effect in the nearshore.

There are significant differences in the water conditions of the bay between summer and winter. In **summer**, wind from a south-easterly direction results in currents that flow northwards in an anti-clockwise motion within the bay. Upwelling cold water (9 - 13°C) invades Table Bay from the Oudekraal upwelling centre south of Table Bay, resulting in generally shoreward bottom flows. Water temperatures can increase rapidly to more than 20°C during relaxation phases of the

upwelling cycle as water flows into Table Bay from the north and north-west. Upwelling and solar heating in summer leads to a highly stratified water column (CSIR, 2006a).

In **winter**, wind from a north/north-westerly direction drives water towards the south, producing a slight clockwise motion. Winter seawater temperatures are more uniform than in summer and fall into the narrow range of 14 - 16°C, as there is no upwelling of cold water and strong mixing of water columns during storms (CSIR, 2006a).

Typical wind-driven surface current velocities are between 20 and 30 cm/s. Bottom current velocities reach less than 5 cm/s. Recent studies showed comparatively short residence times for surficial sediments in Table Bay, suggesting that the main driver for sediment turnover are episodic winter storms that probably also flush the waters of the bay. Salinity in Table Bay appears to be quite uniform and ranges between 34.7 and 35.3 ppt. Two rivers, the Diep and Salt River, flow into Table Bay, lowering the salinity in the vicinity of the discharge area (CSIR, 2006a).

5.1.4 Marine Ecosystem

Table Bay

The marine ecosystems in Table Bay comprise seven different recognisable ecological **habitats**, each supporting a characteristic biological community:

- Sandy beaches, extending from the Salt River mouth north past Blouberg;
- Rocky shores, at Blouberg Rocks and Robben Island and extending south of the harbour past Sea Point;
- Artificial surfaces of the harbour itself plus the shore protection extending towards Salt River;
- Subtidal sand substrata;
- Subtidal rock substrata in the bay;
- Water body in Table Bay; and
- Water body in the Port of Cape Town.

The habitats and water upwelling process in Table Bay support well-developed **biological communities** that are typical of the west and south coast regions of the Western Cape. They include pelagic (e.g. pilchards and anchovy) and demersal (e.g. hake and kingklip) fish stocks, nearshore stocks (e.g. linefish, rock lobster and abalone), mammals (e.g. seals and whales) and seabirds (e.g. penguins, gannets and cormorants) (Lwandle, 2006a).

Table Bay does not appear to be critically important for marine fauna as either a foraging or breeding area or for the fishing industry. Exceptions are endemic seabirds that occur in the bay, such as the Bank Cormorants and African Penguin, which feed and breed in Table Bay. Both species are considered vulnerable in terms of the IUCN criteria. The African Black Oystercatcher is classified as near-threatened (Lwandle, 2006a).

There are resident, semi-resident and migrant cetaceans (e.g. dolphins and whales) in Table Bay. The most common is the Southern Right Whale, which seasonally migrates into South African waters between May – October/November and is regularly sighted in Table Bay. Southern Right Whales are classified as Vulnerable under the IUCN criteria (Lwandle, 2006a).

Four species of seals are found around the West Coast. The Cape Fur Seal is the most common in Table Bay but has no breeding colonies there. A historical seal colony at Robben Island was destroyed by disturbance and sealing in the early 20th century. Other, far less common, seal species include the Subantarctic Fur Seal, the Leopard Seal and the Southern Elephant Seal (Lwandle, 2006a).

Table Bay is a receiving environment for **discharges** and spills from port activities and effluents and contaminants from stormwater outfalls of the City of Cape Town. While there is some contamination of sediments and biota adjacent to contamination sources, there is no evidence of contamination build-up in the bay, which is regularly flushed by wave and circulation processes (Lwandle, 2006a).

Some of the marine resources in Table Bay are exploited by **commercial and recreational fisheries**. These include (Lwandle, 2006a):

- Abalone – There are commercial fishing zones from Cape Point to Mouille Point, Blouberg to Cape Columbine and at Robben Island. Most abalones are found on rocky reefs shallower than 10 m and are closely associated with kelp beds;
- White mussel – White mussels are harvested recreationally for bait and consumption. A large population occurs at Bloubergstrand (Big Bay) and Milnerton Beach;
- Commercial linefisheries – The Table Bay region supports commercial linefisheries for a number of species such as Hottentot, Snoek, Long Fin Tuna, Chub Mackerel and Chokka. The number of boats involved in the fishery is relatively large, with up to 100 boats on the water during snoek 'runs', particularly around Robben Island. Hottentot is most regularly fished in deeper reefs 3.5 – 5.5 km offshore south of Mouille Point.

Port of Cape Town

Species associated with artificial surfaces in the port may have different community structures than those found in more natural habitats. Harbours are also typical locations for the introduction of alien species through ships transporting organisms on their hulls or in their ballast waters (Lwandle, 2006a).

Large numbers of juvenile rock lobsters can be found on the vertical faces of the **outer harbour wall**. Other major components of the wall community are encrusting corallines, barnacles, sea urchins, mussels and sponges. The biofouling community appears to be well-developed at the outer harbour areas (Lwandle, 2006a).

Further into the harbour, benthic species diversity declines drastically. In addition to a few barnacles, sea squirts and green algae, the alien anemone *Metridium senile* and alien European shore crab *Carcinus maenas* have been found. The sites with the lowest diversity and sparsest cover are near the dry dock and the synchro-lift in the Alfred Basin. Benthos inhabiting the sediments within the harbour appears to be limited if not completely absent in the interior of the Victoria and Alfred Basins, attributed to a high level of anoxia within the sediments and pollution in these basins. No benthos sampling results have been reported for the Ben Schoeman Dock or the outer areas of the harbour (Lwandle, 2006a).

There appears to be no published information on communities inhabiting the water column in the harbour. It is known that euphausiids occasionally occur in the port, reaching densities sufficiently high to clog the Two Oceans Aquarium seawater intakes. Small shoals of Mullet can be common in

the outer harbour area, particularly along the seawalls between the entrance to Duncan Dock and the western breakwater. There is also a resident or semi-resident Fur Seal population within the Port (Lwandle, 2006a).

Proposed Dredge Disposal Sites

Site 1 (see Figure 5-1) displays a higher benthic biomass and biomass richness and evenness than Site 2. Site 2 has a lower benthic biomass and an increased diversity in benthic macrofaunal community structure, in line with the higher diversity of habitats within Site 2. Both sites display taxon/abundance relationships that do not indicate any pollution effects (Lwandle, 2006a).

The macrobenthic fauna abundance on **Site 1** is dominated by Annelida, most of which are polychaete worms. Crustaceans and molluscs are also represented. Despite being relatively minor contributors in terms of abundance, molluscs and other fauna dominate the biomass. There appears to be a high degree of homogeneity across the site. Rare taxa appear to be well represented (see Figure 5-4) (Lwandle, 2006a).

The macrobenthic fauna abundance on **Site 2** is even more clearly dominated by Annelida (polychaete worms) than on Site 1. Molluscs and other taxa also make smaller contributions to the benthic macrofauna community biomass than at Site 1 (see Figure 5-4) (Lwandle, 2006a). The distribution of abundance amongst the taxa is more skewed on Site 2 than on Site 1, in line with the wider range of sedimentary habitats on Site 2. They may be more unstable than in those on Site 1, as indicated by the well developed ripples in the coarser sediments shown on the side-scan.

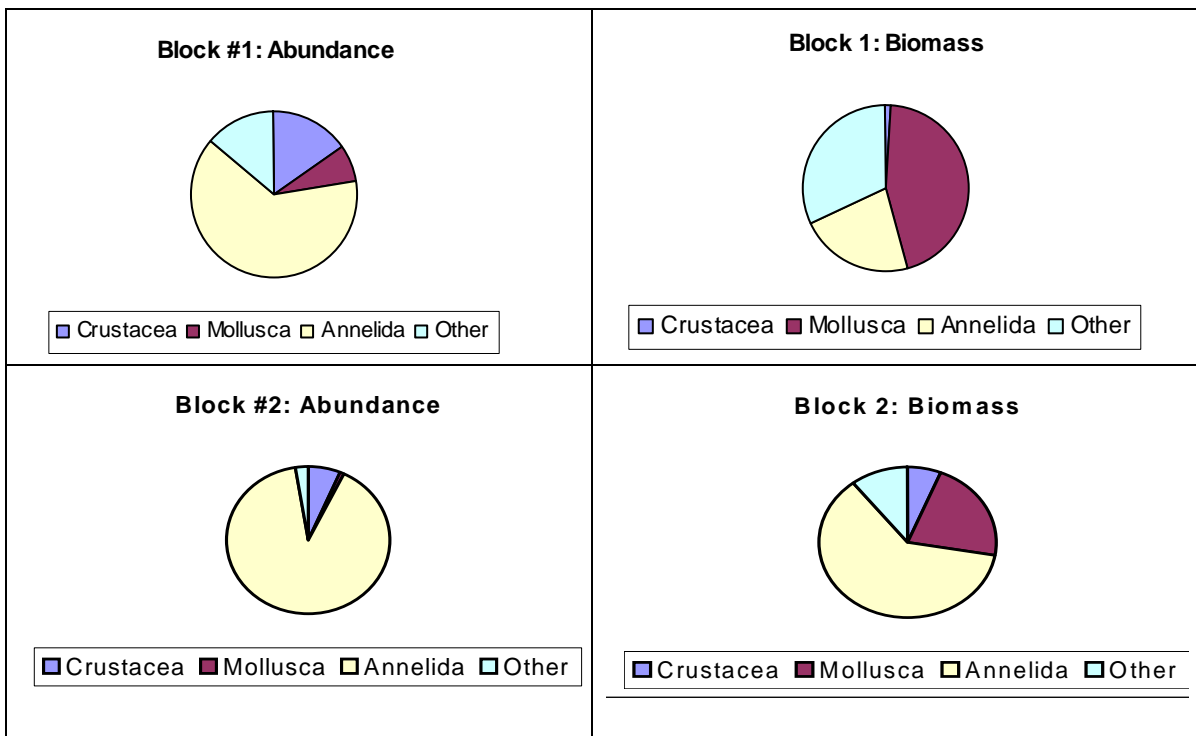


Figure 5-4: Macrobenthos abundance and biomass at dredge disposal sites 1 and 2²³

Source: Lwandle, 2006a

²³ Note that “Block 1” and “Block 2” essentially represent the characteristics of macrobenthic fauna at “Site 1” and “Site 2” respectively, but also include some sampling points outside of the actual site in each case (i.e. thus representing a larger area in each case)

5.2 Socio-Economic and Cultural Environment

5.2.1 Port Infrastructure and Operations

The Ben Schoeman Dock is located within the Port of Cape Town, which is situated at the southern shore of Table Bay, to the north-east of Cape Town Central Business District (CBD) and north of Table Mountain. Besides the Ben Schoeman Dock the Port of Cape Town also comprises the Duncan Dock and the Victoria Basin. The Port houses various economic activities, including commercial activities such as cold storage facilities, fishing and import and export. Between 4 000 and 5 000 vessels per annum utilise the port.

The areas surrounding the Victoria Basin have been redeveloped to house the world-renowned recreational and commercial facilities which comprise the V&A Waterfront. The basins themselves currently house local fishing fleets and port marine services such as tugs and crane vessels. The Robinson Dry Dock and the Syncrolift ship lift are important ship repair facilities which are also situated here.

The Duncan Dock houses the Fresh Produce Terminals as well as the Multi Purpose Terminal, which facilitates the bulk and break-bulk cargoes in the port. The Royal Cape Yacht Club occupies the small craft basin which is also situated in the Duncan Dock. The Sturrock Dry Dock, the Tanker Basin which handles fuel throughput, as well as the Eastern Mole which facilitates other liquid bulk products, are also situated in this dock.

The Ben Schoeman Dock, which is the site of the proposed berth deepening, is the dock which facilitates all containerised cargo. The Cape Town Container Terminal is situated here. The berth deepening is being proposed to support the increased demands of this terminal (Shangoni, 2006).

5.2.2 Port of Cape Town within the Socio-Economic Environment of the Western Cape

The Port of Cape Town is a landmark feature of the City of Cape Town, lending a maritime dimension which is integral to the city's cultural landscape. It is a gateway to the city's tourism industry, standing side-by-side with the world-renowned V&A Waterfront. The Port is a key feature in the regional economy of the Western Cape, and influences the city's spatial development and employment opportunities.

The Port is the site of a number of economic activities. These include:

- Commercial activities such as cold storage facilities and container depots;
- Import and export: the Port's export function is an important contributor to the Western Cape economy. Through its export of fresh produce - much of which is grown in the region - it is integrally linked to the agricultural sector. In 1997 its exports contributed 16% to the Western Cape's Gross Regional Product and supported economic activities which employed almost 500 000 people;
- The leasing of terminals to private enterprises;
- The transport of petroleum products, with a throughput of 3 million tonnes per annum;
- Fishing, with the Port representing an important support and control site for the fishing industry; and

- Tourism and recreation activities, with the berthing of cruise liners and the Two Oceans Aquarium, as well as the close and complex relationship that exists between the Port and the V&A Waterfront. The maritime atmosphere which the Port provides is a key attraction for visitors to the Waterfront and to Cape Town.

The Port of Cape Town provides a range of employment opportunities, both from direct employment as well as from related activities such as ship repair and engineering services. The Port property also hosts a number of businesses whose activities are unrelated to the Port. In 1998, it was calculated that approximately 5 300 people relied on the Port (directly) for employment. More than 90% of those employed directly in Port operations come from the impoverished areas of the Cape Flats. The Port is thus a key contributor of income to these poorer communities.

In addition to the benefits through employment which the Port provides to the City of Cape Town, a more integrated relationship between the Port and the City could improve road infrastructure planning, as well as capitalising on tourism opportunities and improving public access to the Port;

The expansion of Cape Town's container handling capacity is closely linked to broader Western Cape and National economic and trade conditions. The Western Cape Province represents around 15 % of the National economy, based primarily upon the presence of Metropolitan Cape Town. The city generates around 77 % of the Region's Gross Domestic Product (GDP) and is the major centre for population, employment and commercial activities.

There is an expectation that the Western Cape economy will continue to expand between 4 and 5 % over the medium term. With the primary drivers remaining stable, expansion will be primarily led by consumer demand and capital investment.

It is estimated that 75 % of Cape Town's container throughput is generated or destined for locations within 50km of the port. Of the balance an estimated 15 % is distributed within a hinterland stretching 50-200km from the Port and the balance related to other South African destinations, notably Gauteng.

5.2.3 Tourism and Recreational Activities in Table Bay

Robben Island, the world-famous site of Nelson Mandela's imprisonment, is situated in Table Bay. The Island has been declared a National Monument, as well as receiving World Heritage Status, and receives thousands of local and foreign visitors annually. The tours launch from the Port and as such, Robben Island provides a critical marketing link to the Port.

Table Bay is also the site of a number of recreational activities, including fishing, power boating, leisure cruises, surfing and sailing events (Shangoni, 2006).

The Victoria and Alfred Waterfront serves as a significant tourist facility, including a number of restaurants, shopping and entertainment facilities as well as the Two Oceans Aquarium.

5.2.4 Marine Archaeology

The Table Bay region is the site of significant heritage resource material. This material comprises three categories: pre-historical material under water and on shore, shipwrecks and anchorage debris. However, as a result of extensive blasting and dredging activities that took place in the Port of Cape Town during the 1970's, there are areas of the port where much of this heritage resource material has either disappeared, or is no longer *in situ*, thereby losing its contextual archaeological value. The

areas which were less disturbed during the 1970's have higher archaeological significance because of the increased likelihood of finding heritage artifacts in these areas (Werz, 2006).

Pre-historical material underwater and on shore: On 4 February 1995, one of the most pristine examples of an Acheulean hand axe, dating to the Paleolithic period, was discovered approximately 100 metres offshore opposite Paarden Eiland. This provided evidence of the earliest periods of human presence in the Table Bay region. Human burials of indigenous people along the shores of Blaauwberg, Milnerton and Paarden Eiland dating to 3000 Before Present (BP), as well as more recent burials dating to the early colonial period, also provide archaeological evidence of human presence in the region.

Shipwrecks: During the nineteenth and twentieth centuries, the Port of Cape Town developed in response to its importance as a shipping route, with a proportional increase in shipping traffic and the associated shipping incidents which often led to total loss of vessels and their contents. The types of vessels ranged from large merchantmen which plied the trade routes between Europe and Asia, to smaller vessels for fishing, reconnaissance and the transfer of goods and passengers. These shipwrecks represent the richest source of heritage resource material for maritime archaeologists, especially as they are derived from at least 21 different nations.

The cause of the wrecks could most often be attributed to natural conditions, with the strong westerly and north-westerly winds trapping the ships in the bay and pushing them into the shallows or onto shore. The majority of the 360 identified wrecks in Table Bay are near the south and south-eastern shores of the bay and, owing to land reclamation since the latter half of the nineteenth century, many of the sites are now covered by the Foreshore and the Cape Town Waterfront.

Anchorage debris: The old anchorage grounds, or roadstead, opposite the Castle, have been partly covered by later developments. The remaining roadstead may, however, be the site of anchorage debris, which includes lost anchors and equipment and cargo lost or jettisoned overboard. In addition, owing to the lack of exact demarcation of the roadstead, as well as that ships may have put anchor beyond the anchorage grounds, it is not possible to demarcate an exact area where anchorage debris may be found, but suggests a general area east of 18°24' longitude and south of 33°50' latitude (CSIR, 2004).

5.2.5 Visual and Aesthetic Environment

The City of Cape Town and the area around the port in particular accommodate a number of different activities and users that influence the sense of place at a micro and macro scale. Areas outside of but adjacent to the Port of Cape Town to the east and south, particularly Paarden Eiland and Beach Road in Woodstock, are industrial in nature. Areas located further to the south and south-west, including Woodstock, Zonnebloem, the Central Business District (CBD) and the V&A Waterfront, are dominated by residential and commercial uses. Relevant areas are indicated on Figure 5-5.



Figure 5-5: Industrial, residential and commercial areas around Port of Cape Town

The Port of Cape Town itself is a working harbour with a long history. The port is now a modern harbour serving Cape Town and its hinterland. It is equipped with an extensive industrial infrastructure designed to accommodate, load and offload vessels with a wide range of sizes and cargoes. The sense of place is one of a working harbour in a visually appealing context, which creates a visual character that is industrial but congruent.

The mountains surrounding the city and Table Bay provide a number of viewpoints over the bay, which includes the port. These view points include the tops of Table Mountain (accessible on foot or by cable car), Lion’s Head (accessible on foot) and Signal Hill (accessible by car) (see Figure 5-6).



Figure 5-6: Port of Cape Town and surroundings

5.2.6 Traffic and Transport

The transport infrastructure within the vicinity of the Port of Cape Town comprises both a road and rail network.

The roads primarily serving the port are Duncan Road (not a public road), Marine Drive; the N1 Freeway and the N2:

- The N1 links Central Cape Town and the Port to the rest of the metropolitan area and the hinterland. In the vicinity of the Port, the N1 carries very high commuter peak period flows and operates under congested conditions (due to commuter traffic) in the peak direction of flow for approximately two hours during each of the weekday commuter peak periods;
- Marine Drive links Central Cape Town and the Port to Milnerton and Table View as well as the industrial areas of Paarden Eiland, Marconi Beam and Montague Gardens. Traffic conditions on Marine drive during a typical working day can be summarised as follows:
 - AM peak period (06h30 – 09h00): high levels of congestion along Marine Drive in the southbound direction; lower levels of congestion in the northbound direction, but significant delays accessing Marine Drive via the N1 Freeway.
 - Inter-peak period (09h00 – 16h00): lower levels of congestion along Marine Drive in north- and southbound directions, although due to the occurrence of “peak extension” and general traffic growth, these levels are steadily being raised.
 - PM peak period (16h00 – 18h00): relatively low levels of congestion along Marine Drive in the southbound direction; high levels of congestion in the northbound direction.
- Duncan Road lies within the port’s functional area. Peak hour flows on Duncan Road also reflect commuter patterns related to the CBD as this route is used as a “rat-run” for traffic wishing to bypass congestion at the Marine Drive interchange with the N1. It should be noted that these flows are at present considerably lower than in 2003, when a previous survey was done, due to the stricter controls at the access points to the Port.

The following freight rail operations are relevant to this investigation:

- Along the Harbour/ Monte Vista rail line, which runs adjacent to Marine Drive and then adjacent to Duncan Road within the port functional area, and terminates at the Unity Yard. Currently, there are approximately 18 train movements along this line during the day (between 06h00 and 18h00), and 12 at night. This translates into average train headways (time intervals between successive trains) of 40 minutes during the day, and 60 minutes at night; and
- Between the Paarden Eiland and Unity Yard along the rail culvert underneath the N1 Freeway. Currently there are approximately 12 train movements along this line during the day, and 8 at night. This translates into average train headways of 60 minutes during the day, and 90 minutes at night.