SECTION 4: DESCRIPTION OF THE AFFECTED ENVIRONMENT

4.1 BIOPHYSICAL ENVIRONMENT

4.1.1 Climate

The Saldanha Bay area is characterised by a semi-arid Mediterranean climate which is strongly influenced by the cold Benguela Current and coastal berg wind conditions. The dry summer months occur from October to April while the majority of precipitation occurs during the winter months (May to September) as indicated by Figure 4. Rainfall averages from 260 – 280 per year (www.weathersa.co.za, accessed 23 May 2007), although Awad et al. (2004) report lower figures. Seasonal temperature variations are slight, with maximum temperatures ranging from 20 – 30ºC and minimum temperatures ranging from 5 – 15℃ throughout the year (Table 4) . The climate is strongly influenced by the cold Benguela Current and coastal berg wind conditions.

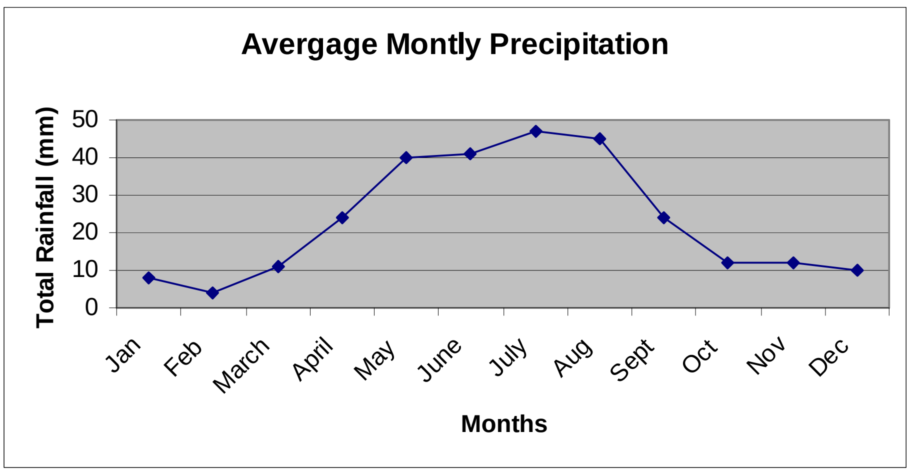

Figure 4: Average monthly temperature

The prevailing winds are predominantly from the south-west during summer and from the north and south west during winter. Summer winds can exceed 30 km/hr for more than 20% of the time but winter winds are not as strong. Berg wind conditions can exceed 30 km/hr for more than 15% of the time during winter (CSIR, 1995).

Due to the orientation of the entrance channel to the port of Saldanha in a more northerly direction, the predominant wind direction will be quartering (about 45 degrees) relative to the entrance channel. The predominant south-westerly wind in summer will blow towards Saldanha, into Small Bay. The north-westerly wind in winter will blow towards Langebaan, into Big Bay.

Table 4: Weather characteristics for the study area

Summer Air Temp (°C)		Winter Air Temp (°C)		Total Rainfall (mm)	
Av day	Max day	Av night	Min day	Driest 6 Months	Wettest 6 Months
26.0	35.0	10.0	4.0	69	274

4.1.2 Air Quality

Air quality conditions in the region are the sum total of the operations of a number of activities (emitters) and are dependent on the meteorological conditions in the area. The main air pollutant of concern in the region is dust (total dust and dust from particulate matter greater than 10µ [PM10]). In a study to determine the potential impacts of expanding the general cargo quay, Boegman and Wells (1995) estimated the emissions from Black Mountain Concentrates, Namakwa Sands, Mittal Steel, the General Cargo Quay and the Iron Ore Terminal. It was noted that a typical factor resulting in variable levels of dust generation at the iron ore terminal was the proximity of the ship loading boom to the hold of large tonnage ships, during iron ore loading. It was also evident at the time that dust control was a major concern.

The Boegman and Wells study (1995) showed that total dust fallout was highest during the dry summer period. With the exception of the November 1993 to February 1994 period, the total dust values did not correspond to high iron values. It was therefore concluded that particularly during the dry period there was a high level of general wind-blown dust.

The air quality assessment that was undertaken for Phase 1A (expansion to increase throughput from 24 MTPA to 38 MTPA) concluded that in the absence of refurbishment, further mitigation and an increase in the direct transfer of ore to the ship loaders, there would be unacceptable impacts on the air quality in the vicinity of the terminal. One of the potential issues identified was the associated health hazard. Since then, a number of dust suppression measures have been implemented at the terminal, including: installation of telescopic chutes on the Ship Loaders, replacement of the existing Stacker Reclaimers with systems comprising an efficient liquid spray system and fixed spray cannons which are triggered by exceedances in threshold wind speeds. Other control measures are planned, some of which are currently being investigated or implemented. The implementation of an air quality management plan comprising ambient air quality and meteorological monitoring, information dissemination and periodic progress reviews is one of the main measures that have been taken.

Dust is also generated during the ore handling at Tipplers, Stackers Reclaimers, Conveyors and Shiploaders. Existing dust monitoring indicates that areas to the north east of the facility are impacted by the dust from the terminal. Other dust control measures that have been implemented include spraying of stockpiles and transfer points with water, a dust extraction system at the Tippler, and dust control additives for the ship loader. These measures have significantly reduced the dust generated from on-site operations. An independent consultant currently compiles quarterly and annual dust monitoring reports.

4.1.3 Topography

The Port is situated on the northern shore of Saldanha Bay. The surrounding area is characterised by a gently undulating coastal plain with low hills. The highest points in the area include Malgaskop (173 m above mean sea level) to the west, Karringberg (175 m above mean sea level) to the east, and Postberg on the Langebaan Peninsula (192.8 m above mean sea level) to the south. Several smaller hills and outcrops of granite boulders are also evident in the surrounding area.

4.1.4 Marine and Benthic environment

This section provides a brief description of the environment to be affected by the proposed expansion. The study area is located in Saldanha Bay, a coastal bay located in the southern Benguela Upwelling System (33°S, 18°E), approximately 100km north of Cape Town.

Saldanha Bay is linked to the Benguela System to the west and the large shallow Langebaan Lagoon, which is a RAMSAR listed site since 25 April 1988. The Saldanha Bay/Langebaan Lagoon complex represents a significant regional source of shelter from wave action along the highly exposed South African west coast (Beckley 1984, Field and Griffiths 1991). As such, it represents an important nursery or calm water area for many marine fish and invertebrate species (Day 1959, Clark 1997). Saldanha Bay is the largest enclosed Bay on the west coast of southern Africa with an area of ca. 57 km^2 (Siegfried 1977). The construction of a 4km long jetty built in 1975 divided the Inner bay into a Small Bay (1 516m^2) and a Big Bay (4 473m^2) (Awad *et al*. 2004).

A man-made seawater dam east of the jetty came into being as a result of the construction of an oil pipeline from the ore loading jetty, which cut off a small portion of Saldanha Bay immediately adjacent to the jetty. The dam covers 32ha and has an average depth of 4m, with a maximum depth of 8m. It is closed off from the sea except for one inlet that allows a tidal fluctuation of less than 10cm (Brown *et al*., 1982). The intention of Transnet has been to reclaim the entire area of the dam over time for expansion. The dam was used for oyster cultivation prior to 2006, and it was a popular fishing spot for local anglers. The oyster farming ceased when the lease ended at the start of 2006 and the workers have been employed elsewhere. Use of the reclamation dam must be reviewed and is subject to new legal requirements in terms of the International Shipping and Port Security Code (ISPS), which has been accepted as legislation by National Government.

No rare or threatened species have been recorded previously in the area proposed for dredging. Therefore the risk of species loss may be negligible. The introduction of alien species via ballast water discharge in Saldanha Bay is a high risk for the indigenous species and may increase as a result of the proposed expansion. Therefore it is strongly recommended to discharge the ballast water in the open sea prior to entering the bay and to comply with the Ballast Water Convention (International Convention for the Control and Management of Ships Ballast water and sediments).

It is important that the Marine and Benthic Ecology studies determine the potential impacts the proposed expansion could have on the fish life at the bay, macro benthos and general habitat of Saldanha Bay.

4.1.5 Shipping Traffic

An entrance channel has been dredged from a position just south of Marcus Island up to the tanker terminal and the ore berths (see Figure 1). The length of the dredged entrance channel up to the southern tip of the jetty is about 1.8 km. This channel has been dredged in the calcareous bed material to a depth of about -23.5 m Chart Datum (CD), and has a bed width of about 400 m. A turning circle has been dredged just in front of the end of the jetty (caisson 25), with a diameter of 600 m and a depth of -23.1 m CD.

Wave conditions in the entrance channel are moderate compared to deep sea. At the channel, a significant wave height of 4 m is statistically exceeded once a year, as compared to a significant wave height of 7.8 m offshore in deep water. Due to wave refraction into the bay, the wave heights gradually decrease towards the jetty. The channel orientation has been designed in such a way that the direction of propagation of the (refracted) swell is in line with the channel. This will result in minimum vertical ship motions, consisting mainly of heave and pitch. Only during the turning manoeuvre will the ship be exposed to beam waves, resulting in roll motion of the ship. However, in this case pitch motions will be very small.

Currents in Saldanha Bay are mainly generated by the wind and the tide. The tidal current velocities between Marcus Island and Elands Point are amplified due to the constricted flow area, but the current velocities mostly remain well below 0.3 m/s in the entrance channel. The direction of tide-driven currents is mostly in line with the channel. The direction of the currents in the channel due to the direct wind shear and the wind-driven bay circulation will usually have a component across the channel.

The original ore loading jetty and the entrance channel have been designed to accommodate ore carriers of up to 320 000 DWT, with a maximum draught of about 21.5 m. In practice, ore carriers of up to 340 000 DWT, with a maximum draught of up to 22.5 m and a length of up to 350 m, can be accommodated at the existing ore berth (Big Bay side). The dredge depth at the existing channel is –22.5m CD and the draft in the entrance channel is restricted to 21.5m at high tide. Most of these bulk carriers are larger than 100 000 DWT, while about 50 of the approximately 700 bulk carriers in the class larger than 100 000 DWT are larger than 200 000 DWT. No ships larger than 300 000 DWT are presently being planned or built (Bayne, 2006). Therefore, the largest dry bulk ships that call presently at Saldanha can be considered as the limit of dry bulk carriers calling that will call at Saldanha in future. The port expansion will therefore not lead to a change in the design class and size of the ships calling at the port, but will approximately double the intensity of their calls (CSIR, 2006).

The open concrete jetty has a total length of about 1 km, with two ore berths on either side of the jetty and a tanker terminal at the end of the jetty, on the Saldanha side. The jetty has been built in line with the entrance channel, in a more or less north-south direction. The tanker terminal and the ore berths have been constructed on figure-eight shaped concrete caissons. A channel with a bed width of 300 m has been dredged along its western (Saldanha) side and a channel with a bed width of 250 m has been dredged along its eastern (Langebaan) side.

A closed causeway of about 3.3 km has been built into the bay, leading straight to and in line with the jetty. A conveyor belt system has been constructed on the causeway and the jetty to feed the Ship Loaders. There are two Ship Loaders at the jetty. Their maximum loading capacity is about 10 000 tonnes per hour (t/h) per ship loader. An oil pipeline runs along the Saldanha side of the jetty up to the tanker terminal at the end of the jetty.

The existing ore berths are on the Saldanha (west) side of the jetty for the smaller vessels and on the Langebaan (east) side of the jetty for the larger vessels. This arrangement is related to the reach of the loading cranes and the difference in distance from the crane rails to the quay edge and fender line, which is smallest on the Langebaan side.

The wave conditions along the jetty are very moderate, with wave heights exceeding 0.5 m only during about 5% of the time. This results in generally safe mooring conditions of the ore carriers along the jetty. However, the nature of the incident swell generates long waves in the bay. These waves have periods in the range of about 2 min to 3 min. This corresponds with the natural period of horizontal oscillation of the larger moored ore carriers (over 200 000 DWT). Consequently, these ships have experienced large surge, sway and yaw motions[5], while mooring lines have been breaking during such conditions.

These mooring problems have been studied in the past (CSIR, 1987) and in recent years (CSIR, 2006). Long-wave action and to a lesser extent wind are the primary causes of the mooring problems at the jetty (CSIR, 2006). It has been found that a proper mooring system would mitigate the mooring problems for these large ships. With more local experience of safe mooring, these mooring problems have diminished. However, it can be expected that the earlier-mentioned mooring problems will still occur during extreme long-wave conditions. The composition of the world fleet of carriers indicates that more than 95% of the bulk carriers are smaller than 220 000 DWT (Bayne, 2006; Connell Hatch, 2007). If a design vessel of 220 000 DWT is chosen, the moored ship motions at the new berths could become smaller.

A wind speed of about 25 knots (13 m/s) is the limit for departure, if this wind is blowing the vessel onto the jetty. Under such conditions the two tugs are not able to lift the vessel off the fenders.

A number of sources of environmental risks, associated with the increase in shipping traffic, have been identified. Such risks are related to individual ships, to ship size and to the iron ore transfer operations. The main risks are related to the accidental release of bunker oil, the grounding of a ship and an accident involving a moored tanker. In the latter case, the oil spill could be much larger than the bunker oil carried by the bulk carrier. This issue and the impacts of possible shipping accidents and related oil spills will be added as a possible major impact to be investigated during the EIA phase.

4.1.5.1 Ballast Water

In order to maintain stability during transit along coasts and on the open ocean, ships fill their ballast tanks with water. Large ships often carry millions of litres of ballast water, which is taken from coastal port areas and transported with the ship to the next port of call where the water will be discharged.

Coastal port areas are home to a wide variety of organisms that live in the water and bottom sediments. As a ship loads ballast it also loads many of the organisms living in that port. These organisms range in size and phyla, from microscopic plants and animals to mussels, crabs, and even schools of fish.

The ballast water of shipping vessels has been a primary method of alien species introduction throughout the world. Scientists estimate that as many as 3,000 alien species per day are transported in ships around the world. Some of the species that survive the trip are able to thrive in their new environment. These bio-invaders can cause disruptions in the natural ecosystem (source: http://massbay.mit.edu/exoticspecies/ballast/fact.html, accessed 17 January 2007).

Most of the current strategies to deal with the problems posed by ballast water focus on minimizing transport and recommend exchanges where ships discharge and refill their ballast tanks in the open ocean.

The environment which will be directly affected by the increased shipping traffic, and potential ballast water issues, comprises the approach route into Saldanha Bay, the entrance channel and the area around the jetty. Indirectly, the Bay and the Langebaan Lagoon may also be affected. This lagoon is also vulnerable especially to oil spills.

4.1.6 Vegetation

An overview of the natural vegetation and developed/disturbed areas in and around the proposed BTS expansion indicates that a total area of about 313.3 ha has been developed or heavily disturbed, whilst some 515.9 ha remains as natural or near-natural vegetation. The latter is dominated by calcrete flats and parabolic dune thicket (90.2%). Development in the area has taken little if any cognisance of the rarity of the resident systems. Langebaan Dune Strandveld (the vegetation type under which the dunes falls) is Vulnerable with 35% of its area having been transformed. Rarity for Saldanha Flats Strandveld (calcrete flats thicket) is even greater (Endangered) with some 65% of its habitat lost (Rouget *et al.*, 2004 in Low, 2007).

Of the 281 plant species recorded from 21 dune sites on the Saldana Peninsula, 20 (7.1%) are on the Red Data list (SaSFlora, 1998 – 2007). The calcrete flats flora supports 177 species (7 sites), but with a proportionately greater number of Red Data species (12 – 6.8%). In both these vegetation types a number of species are endemic to West Coast calcareous systems.

Unique to this stretch of coastline is a recent north-trending parabolic dune system (sensu Low and Pond, 2006) which overrides an older, Late Pliocene (3.8 mya and younger), marine platform (Hendey, 1983). Dunes along the Saldana Bay coast are from the Quaternary (1.7 mya to present) with older inland structures fixed (i.e. vegetated). Vertebrate fossils found at Skurweweg, east of the study site, are of early Pleistocene age (1.7 mya) (Hendey, 1983).

The conservation importance of the Saldanha Peninsula plant life, particularly the calcrete flats, has been recognised as extremely high and this was verified by Low and Pond (2001). The dwarf thicket on calcrete in the area is widely regarded as unique and threatened with 7.5% of species (12 out of 160) being on the Red Data List (SaSFlora, 1998 – 2007). This vegetation type, Saldanha Flats Strandveld (SFS) (Mucina *et al*., 2005) has a conservation rating of Endangered (Rouget, *et al*., 2004), as 55% of this vegetation type has been lost to, among other, agriculture and urbanisation. Langebaan Dune Strandveld (Mucina *et al*., 2005), which occupies the dunes in the area, has a Vulnerable status, having lost some 35% of its original area (Rouget *et al*., 2004). Species rarity is slightly lower than that of SFS with 20 out of 281 dune species (7.1%) occurring on the Saldana Peninsula regarded as Red Data. However, dune sensitivity, in particular the primary system, is much greater than in SFS (sensu Low, 2006).

Dunes form a crucial barrier between the coast and communities inland. Their value is shown in their ability to provide the following functions:

- Provide the coast with a protective buffer against storm seas and high spring tides thus protecting development;
- Act as natural sand traps, preventing beach erosion;
- Have an extremely high aesthetic value;
- Are important outdoor classrooms for environmental education;
- Contain important archaeological sites;
- Are palaeo-environmental markers (e.g. historic sea levels) recording changes in climate and sea levels;

- Are unique mobile geological landforms;
- Represent unique ecosystem types containing rare and endemic plants, animals and biotic communities;
- Form an intrinsic part of the coastal environment, which is the greatest free recreation amenity in the country;
- Are an important source of potable water (in the form of aquifers), sand and minerals; and
- Are an important subsistence resource for rural people in the form of plants and animals, and traditional medicines.

A specialist vegetation study was undertaken by Coastec Coastal Environmental Consultants for SRK in 2000/2001. This study set out to identify whether plant communities and species in the BTS operations area were being negatively impacted by iron ore dust. Although species composition varied between dust-impacted and un-impacted areas, this was attributed as much to habitat variation as dust impacts. It was however noted that the resident perennial plant population appears to have a number of in-built mechanisms which enable species to survive dust (including growth outside the dust season – in winter – and drought-deciduousness).

4.1.7 Avian and Terrestrial Habitat

The terrestrial habitat types surrounding the reclamation dam support low faunal diversities. The species compositions consist mainly of widespread and abundant species with the majority of these classified as being opportunistic species. Although a number of species are endemic to the region and have their core distributions centred in the Western Cape, these species are considered widespread and are commonly encountered.

A number of Important Bird Areas (IBA) are located in close proximity of the BTS expansion area, and these include areas such as the West Coast National Park and Langebaan Lagoon. The latter area is a wetland of international importance (a RAMSAR site), and the extensive salt marshes and mudflats provide foraging habitat for vast numbers of non-passerine water bird species, many of which are migrant wader species. In addition, the five islands (Jutten, Malgas, Marcus, Schaapen and Meeuw) are important breeding platforms for a number of marine bird species of which Malgas Island supports 25 % of the global population of Cape Gannets (*Morus capensis*).

4.1.8 Noise

The Noise-Sensitive Receptors (NSRs) that could potentially be affected by the upgrades are:

- Blue Water Bay, the nearest community, situated approximately 2 km west of the terminal;
- The town of Saldanha, 4 kilometres to the west of the terminal;
- Club Mykonos, which is located 5,5 kilometres to the south-east of the terminal; and
- Vredenburg, situated approximately 4 km north-west of the Salkor Rail Yard.

The town of Saldanha and Club Mykonos are significantly further removed from the ore terminal compared to Blue Water Bay. The noise impact from the ore terminal will be at least 6 dB lower than that measured or predicted at Blue Water Bay.

The noise environment in Blue Water Bay is approximately 6 dBA higher than the typical outdoor level of 50 dBA for a suburban district with little road traffic. This high level, however, is attributed primarily to sea-generated noise and is typical of a coastal area. The shunting noise is clearly audible in the immediate area of the port as well as the Blue Water Bay Holiday Resort. Apart from the port activities, the main noise sources in the area are ships in the bay between the ore terminal and Saldanha town, vehicular traffic and human activities.

The predominant wind direction that could affect the movement of noise in the area is southerly and south-westerly. The wind direction towards Blue Water Bay and the Saldanha town is relatively low reaching only 1% of the time.

The three existing Stacker Reclaimers are the predominant sources of noise as a result of the port's operations. Two of these operate for most of the time simultaneously. However, the worst-case noise scenario is all three operating at the same time.

Train shunting is another significance noise source. The SAPO have performed a series of noise attenuation tests for this noise source. From these tests, it was found that a ballast brake wagon is the most feasible and effective in reducing the noise levels in the near and far field. The Tippler operation is well enclosed and does not present any significant noise source.

4.1.9 Shoreline Evolution

In the mid-1970s a sand breakwater was constructed to protect the Port of Saldanha against wave action. In addition, a 4km pier was built, from the north-eastern shore of Saldanha Bay in a south-south-westerly direction into the bay. This pier divides Saldanha Bay into two parts (see section 4.1.4).

4.1.9.1 Big Bay and Small Bay

The northern sector of Saldanha Bay, Small Bay, is separated from the southern sector, Big Bay, by the 3.3 km long causeway to the jetty. This means that the water circulation patterns in these two sectors have changed compared to the conditions before the construction of the causeway.

The northern areas of Big Bay, east of the causeway and jetty, as well as the southern areas of Small Bay, just behind the sand breakwater, are frequently used by oyster and mussel farmers. The young oysters and mussels are attached to wires, suspended from floating anchored rafts in the bay. The success of this type of sea farming depends to a large extent on the quality of the sea water.

The shores of Small Bay and Big Bay are very popular for recreation and tourism. Well known beaches are located at Bluewater Bay, in the northern area of Small Bay, and at Langebaan, in the south of Big Bay. Due east of Marcus Island is a holiday resort, Mykonos, with its own small craft harbour (CSIR, 2006).

The port expansion could affect wave and current patterns. As a result, the sediment transport rates could be altered and therefore also the location (accretion and/ or erosion) of the shoreline along Saldanha Bay. This development may impact on the beaches in Small Bay, Big Bay and Langebaan. It is expected that the planned development should not impact significantly on the Langebaan Lagoon. Erosion and beach rehabilitation is currently taking place at Langebaan beach and the potential impacts of dredging in the bay will need to assess the erosion of the shoreline within this context.

4.1.10 Geohydrology

The geology of the study area is dominated by three different geological units, namely the Malmesbury Group, the Cape Granite Suite and the unconsolidated Cenozoic coastal deposits. The Cenozoic coastal deposits are recognised as a major aquifer system when in excess of 10m thick. Two types of aquifers occur below the site, namely a natural aquifer in the rock formations on land and a man-made aquifer in the fill material of the reclaimed land from previous port expansions. The upper Langebaan Limestone Member Aquifer is considered to have a better potential than the deeper Uyekraal Aquifer. Groundwater in these aquifers is of a very poor quality and is unfit for domestic, irrigation, certain agricultural and most industrial uses.

Borehole yields in the area are generally low to moderate. Yields in the order of 2 to 5 litres per second (l/s) were reported by du Toit and Weaver (1995) and Krantz (1995). Yields as much as 23 l/s have been reported from the Langebaan Road Aquifer. The potential for use of groundwater for iron ore dust suppression is being investigated and will be reported on in the EIA phase.

There is a potential for leaching into the groundwater which in turn could discharge into Saldanha Bay and the Langebaan Lagoon. However, the chances of this happening is deemed low due to the low rainfall and rainfall intensity, low permeability of the fill material and natural rock formations and its alkaline nature.

4.2 SOCIAL ENVIRONMENT

4.2.1 Visual

The flat coastal plains and scrub provide the area with wide panoramic views over the sea and inland areas. Isolated granite hills are prominent protrusions and have become popular places for residential developments overlooking Saldanha Bay. The land physically encloses the bay, creating calm waters that cause a sense of calmness in the entire bay and in the towns along the bay.

The existing iron ore handling facility is a highly visible element owing to the 4 km pier protruding into the bay, the industrial infrastructure and the large carrier ships docked in the harbour. The facility is highly visible from Saldanha across the bay and from the road network. These elements have become familiar within the seascape setting and contribute to the current character of Saldanha Bay.

4.2.2 Socio-Economic Environment

The affected area falls within Saldanha Bay Local Municipality, which belongs to the West Coast District Municipality. The local municipality encompasses towns such as Saldanha, Langebaan and Vredenburg. Although Saldanha Bay‘s sheltered harbour plays an important part in the Sishen-Saldanha iron ore project, the town is not only important for export but also hosts many other industries, such as, crayfish, fish, mussels, oysters, seaweed, tourism among many others (http://www.saldanhabay.co.za/tourism/saldanha.htm).

The Saldanha Bay Local Municipality covers an area of 1 767 km^2. According to the Municipality (http://www.saldanhabay.co.za) it has a population size of 88 000. Census 2001 reported a population figure of 70 441. This suggests an increase in the population of the area since 2001 of almost 25%. More than 75% of the municipality's population live in Vredenburg, Saldanha or Langebaan as indicated by the graph below:

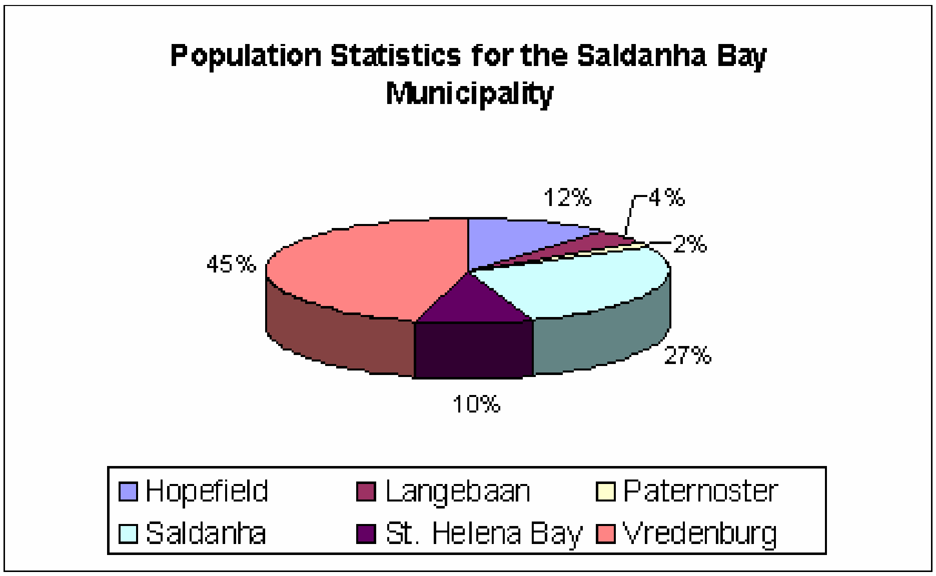

Figure 5: Population statistics for Saldanha Bay Municipality

The majority of the residents of Saldanha (67%) are Afrikaans - speaking coloured people. English and Xhosa are also spoken in the region. The industrial development in the area led to an influx of new people in the area looking for jobs and new opportunities. The population of the Municipal area increased from a total of 57 031 in 1996 to 84 474 in 2001. This is a 48% increase, which will continue to rise with development along the West Coast, such as increased imports and exports from Saldanha harbour, further industrial development and the possible construction of a gas plant in the vicinity of Saldanha Bay. Continued migration will increase the need for the delivery of basic services, and will be accompanied by secondary service-delivery such as health, social and educational services (Saldanha Bay Interim IDP, 2004/5).

The growth rate for the next couple of years is expected to be at least 5%. If this expected growth rate actualises, a population of 250 000 is predicted by 2015. Approximately 33.4% of this population will be employed in the industrial and commercial sectors. This projection assumes that for each primary job opportunity created in the industrial sector, seven people will migrate to the area (Saldanha Bay Interim IDP, 2004/5).

Unemployment is a big problem in the area, especially for people who do not have suitable qualifications. Alcohol and drug abuse are the predominant social problems in the area, leading to an entire spectrum of other problems. According to the Socio-economic Impact Assessment conducted in 2000 (Van Zyl and Malan) the social environment affected by SAPO and NPA has experienced radical changes since the establishment of Mittal Steel. The report stated that Saldanha had the socio-cultural characteristics of a small fishing community with a fair degree of coherence and stability.

The competition for work opportunities at Mittal Steel changed relationships between residents of the established community, and this has left its impact on the social fabric and morale. The influx of newcomers leads to the establishment of shack settlements, a drastic rise in unemployment and an increase in crime and violence.

4.2.3 Cultural Heritage

Until the construction of the R27 provincial road in the 1970s, Saldanha bay was a relatively isolated area only accessible by road via a long drive from Cape Town via the towns of Malmesbury and Darling. The construction of the road and the establishment of the deep water harbour has seen massive development take place. Langebaan has transformed from a sleepy coastal village to a development node complete with yacht harbour, resorts, casino and supermarkets. Similarly the Port of Saldanha has grown significantly absorbing much of what was until recently was a bleak and deserted stretch of shoreline along the northern edge of the Bay. Despite the rampant development, there are still areas that retain the sense of wilderness that until recently characterized the area. Along the Eastern side of the bay (Spreeuwalle shoreline) are semi-stabilised dunes, large tracts of Strandveld vegetation punctuated by granite outcrops which are a characteristic of this area.

In recent years the area has become famous for its fossil wealth – just inland of Langebaan is the largest Miocene (5-6 million years old) Fossil deposit in the world, parts of which are on display at Langebaanweg Fossil Park. Close to Hopefield further inland are the Pleistocene fossil beds at Elandsfontein (last million years) famous for the discovery of the early human species *Homo ergaster* (Saldanha man). On the edges of the lagoon Dr Dave Roberts and Dr Lee Berger discovered the 200 000 year old footprints of an early modern human fossilized in calcrete sediments. At Hoedjiespunt Prof. John Parkington has excavated on the site of an ancient hyena lair where skull fragments and teeth of an early human were found showing that parts of the body of this unfortunate person were consumed by hyenas more than 300 years ago. Nearby, fossilized within the calcretes and aeoleanites are shell fish, animal bone, ashy hearths of people who lived in the area more than 100 000 years ago. A further find at Spreeuwalle close to BTS land has been investigated by Dr Graham Avery and Mr Dave Halkett, but unfortunately most of the material lies below sea level as the site dates to a time when sea levels were lower that that of today. A plethora of Late Stone Age sites dating to within the last 5000 years has been excavated on Club Mykonos and surrounding land firmly demonstrating the hunter gatherers, and later Khoekhoen pastoralists where camping on those parts of the bay where there were rocky shorelines that could provide them with shellfish and other marine foods. Thus it can be seen, like most places in South Africa Saldanha Bay has a past which spans millions of years.

Issues with regards to the cultural heritage could arise depending on the degree to which activities encroach on undeveloped land, in particular the dunes areas where pre-colonial sites may occur. New rail alignments will need to be checked as these are linear developments listed in the NHRA (National Heritage Resources Act, Act No. 25 of 1999).

A further issue will be dredging and breakwater development which could impact on historical shipwrecks (greater than 60 years of age). Thus, in order to identify risk, clarity with respect to breakwater construction and extent of dredging will be required.

4.3 MASTER PLAN FOR THE PORT OF SALDANHA

The master plan for the Port of Saldanha is a long term plan to indicate possible future development. It should be noted that such a plan only serves as an indication of current thinking, and that it can and will change over time, depending on the external circumstances and environment within which the port has to function.

The port was initially designed as an iron ore export harbour for the handling of bulk ore carriers of up to 150 000 DWT, with a length of 291 m and a laden draught of 17 m. Large ore carriers currently load on the east (Langebaan) side of the causeway jetty while smaller carriers load on the west side. The diameter of the turning basin, which is 580 m, was dredged to achieve a ratio of basin diameter over ship length of 2, to safely permit the turning of fully laden vessels (NPA, 2002).

At present, the facilities at the Port of Saldanha include: an artificial breakwater, the Marine (Port Control) Terminal, the Mossgas quay, bulk iron ore handling facility (BTS), a multi-purpose terminal, and the iron ore/oil jetty.

Figure 6: Current layout of the port.

4.3.1 Future Development Scenarios

On identifying options for port expansion in the long term, several potential conflicts and issues arise; these are not necessarily resolvable only in the long term, but actions can be initiated in the medium term (or even short term) in order to address them. Recommendations can then be made to resolve conflicts and to initiate research to address identified issues. This implies that long term planning should be linked to strategic issues relating to national and regional development needs and the relationship between the development of the port and its impact on the national economy.

Based on the Port Development Framework (2001 - 2002), a number of development scenarios were proposed at the port. Alternatives (Figures 7 to 12), illustrate various scenarios for the future development of the port. The alternatives include proposed developments for iron ore, bulk liquids, break-bulk, and possible container berths. These were developed as part of the port's first Port Development Framework Plan 2002.

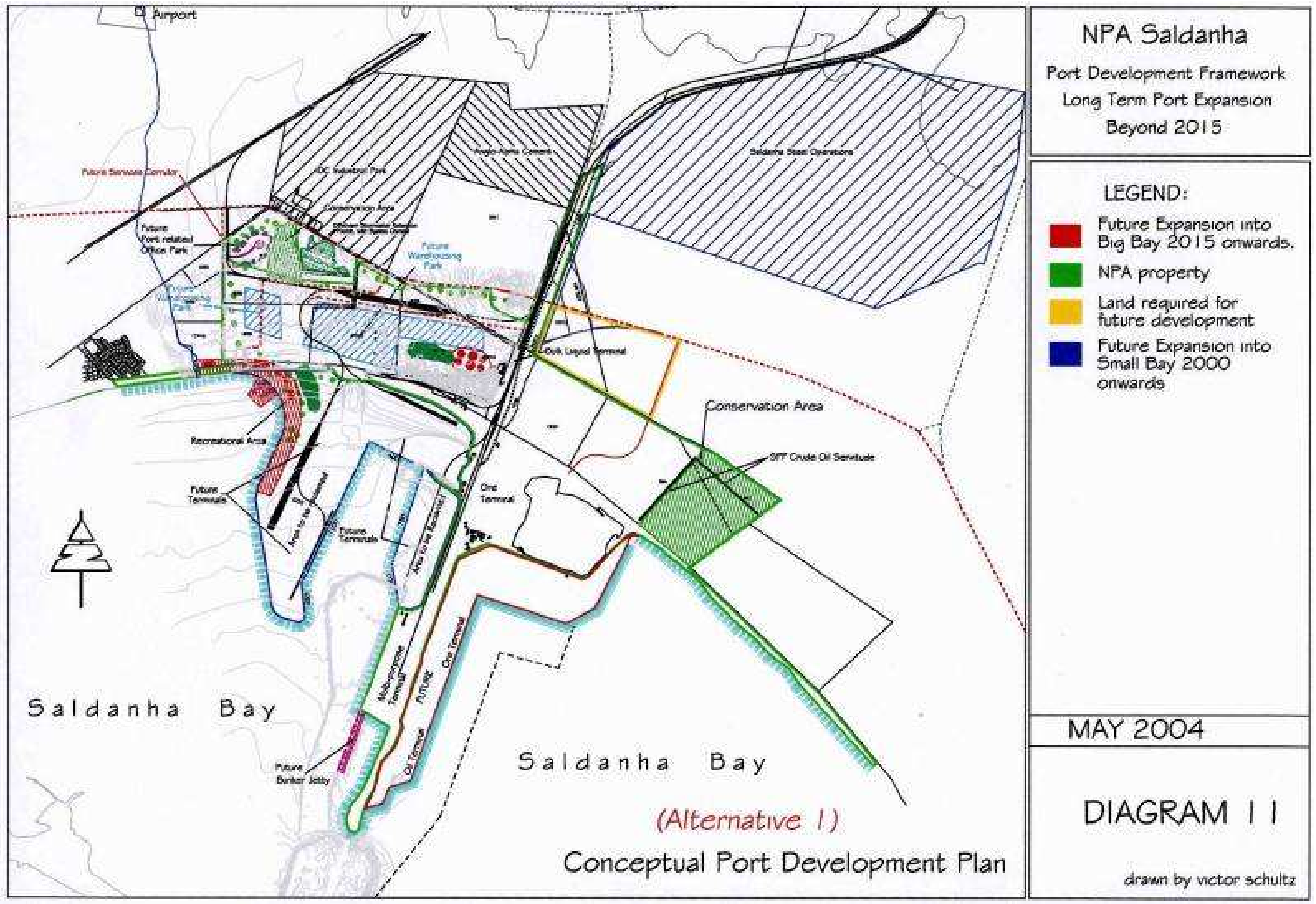

Figure 7: Port master plan - alternative layout No. 1

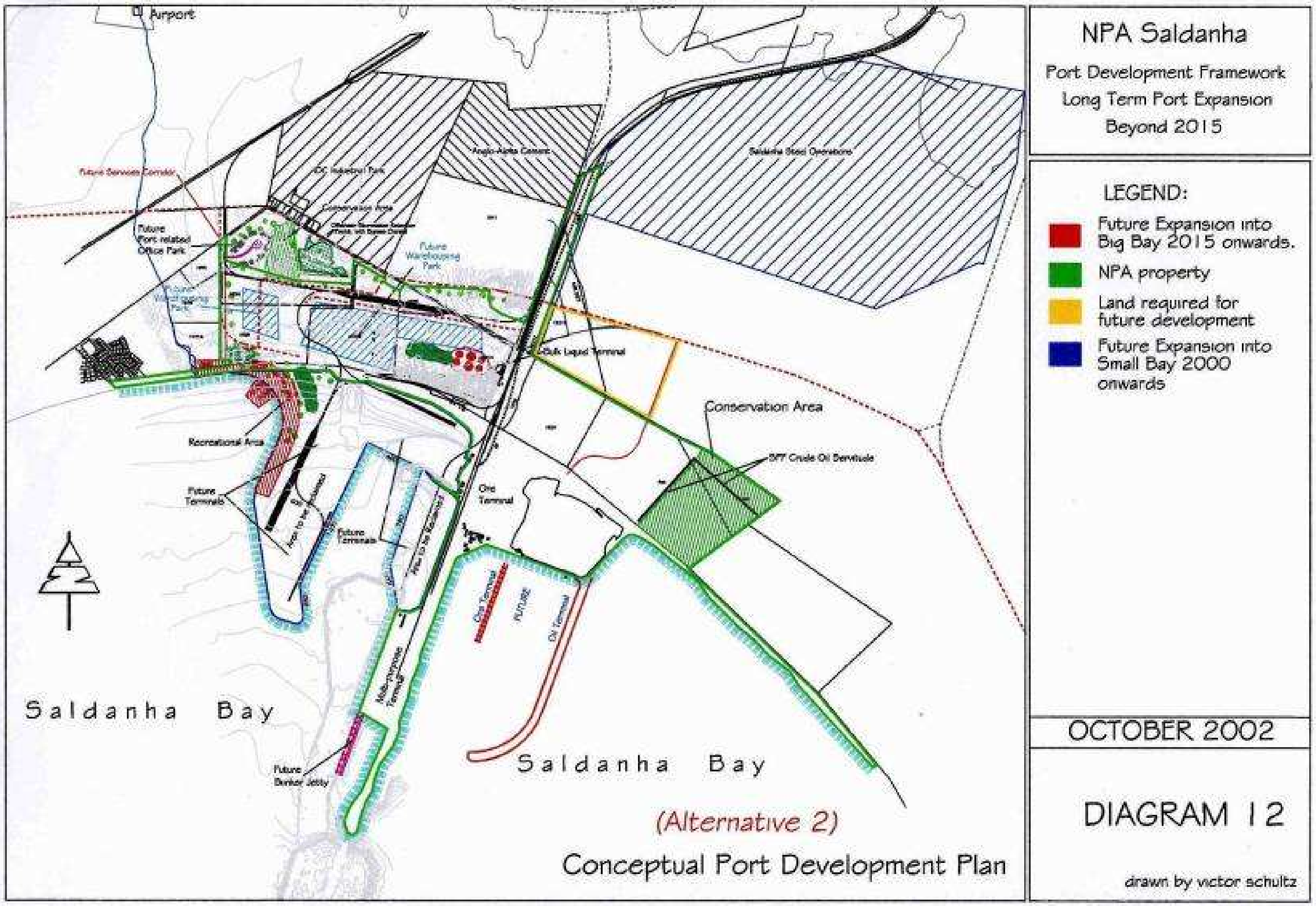

Figure 8: Port master plan - alternative layout No. 2

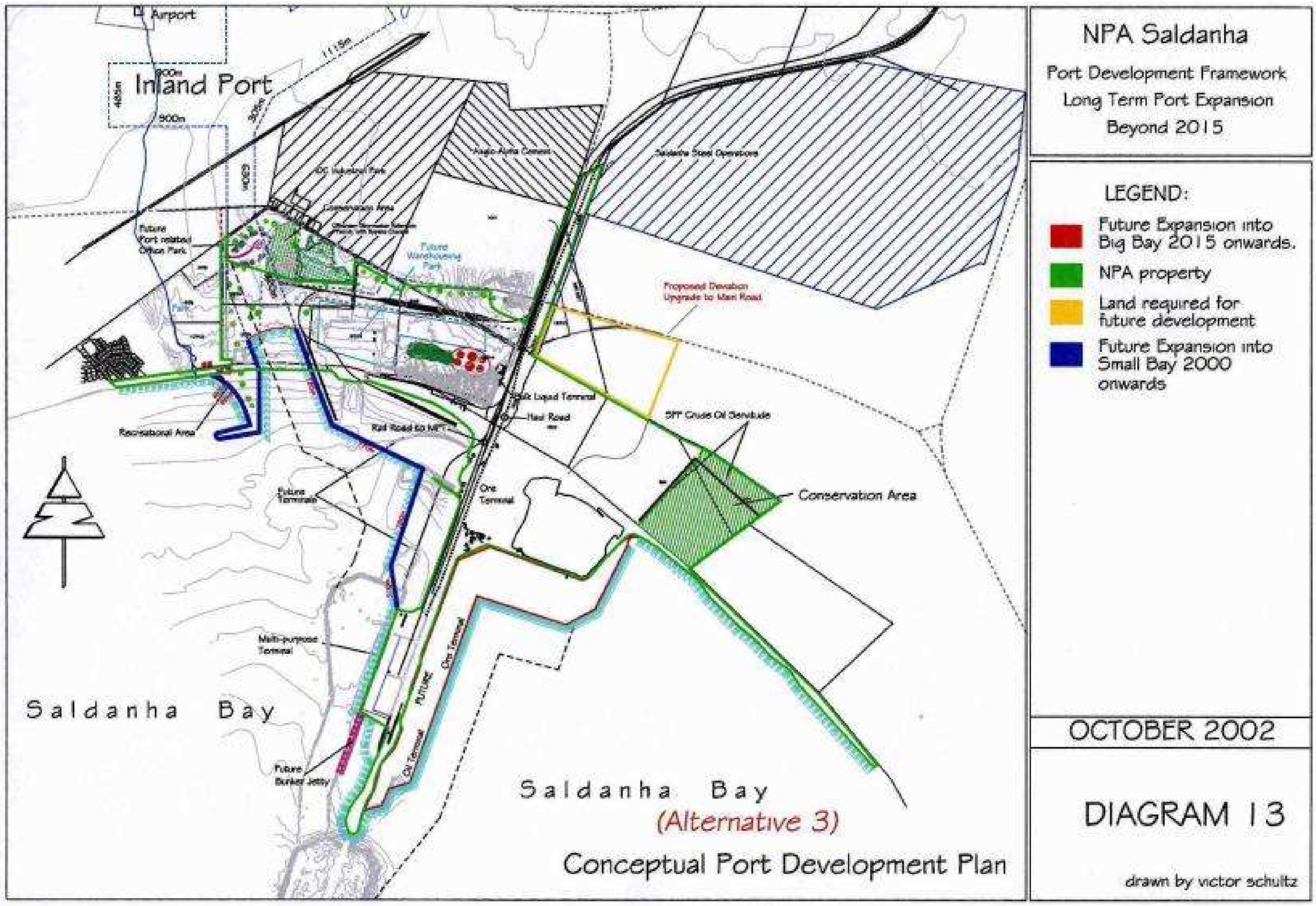

Figure 9: Port master plan - alternative layout No. 3

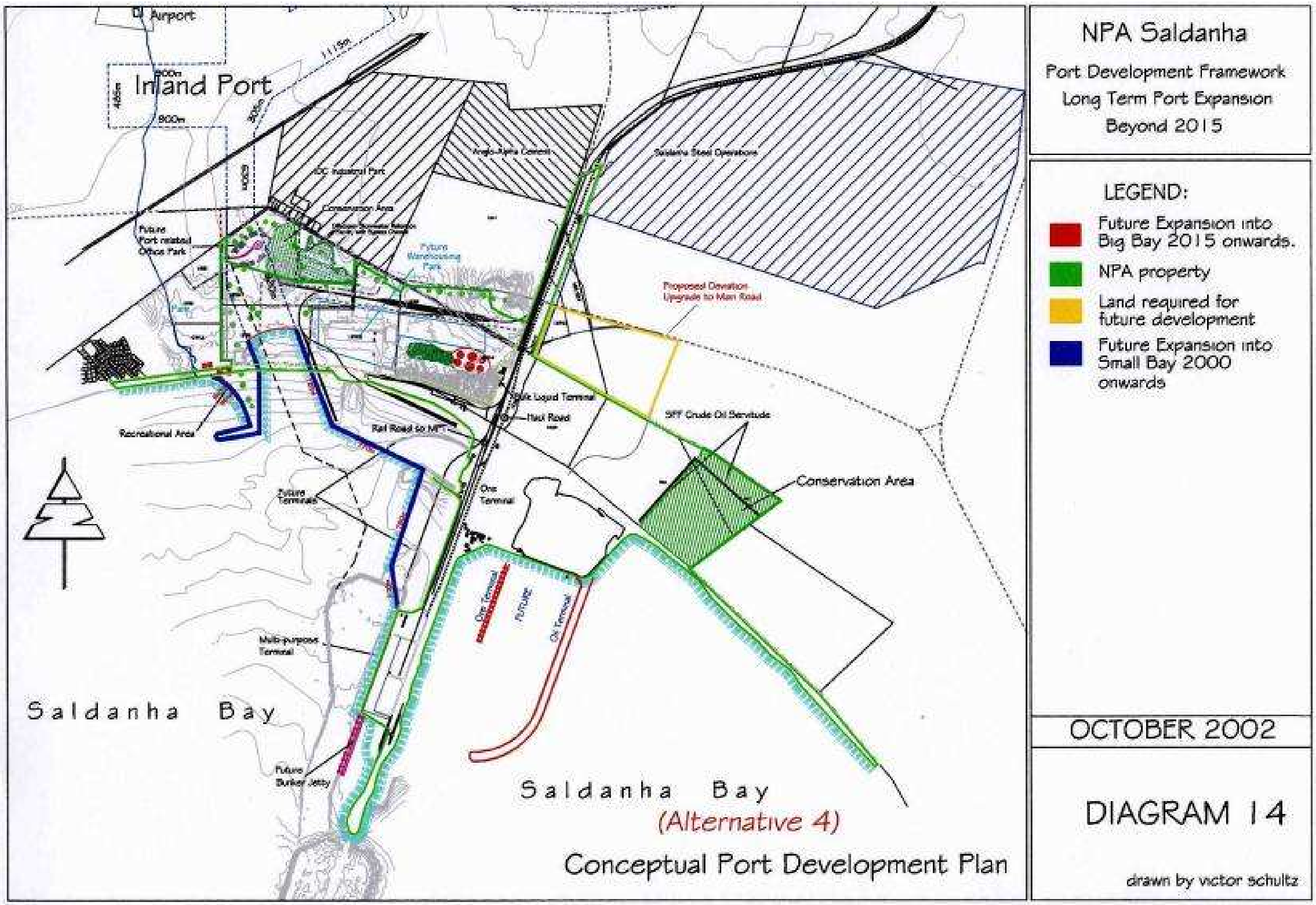

Figure 10: Port master plan – alternative layout No. 4

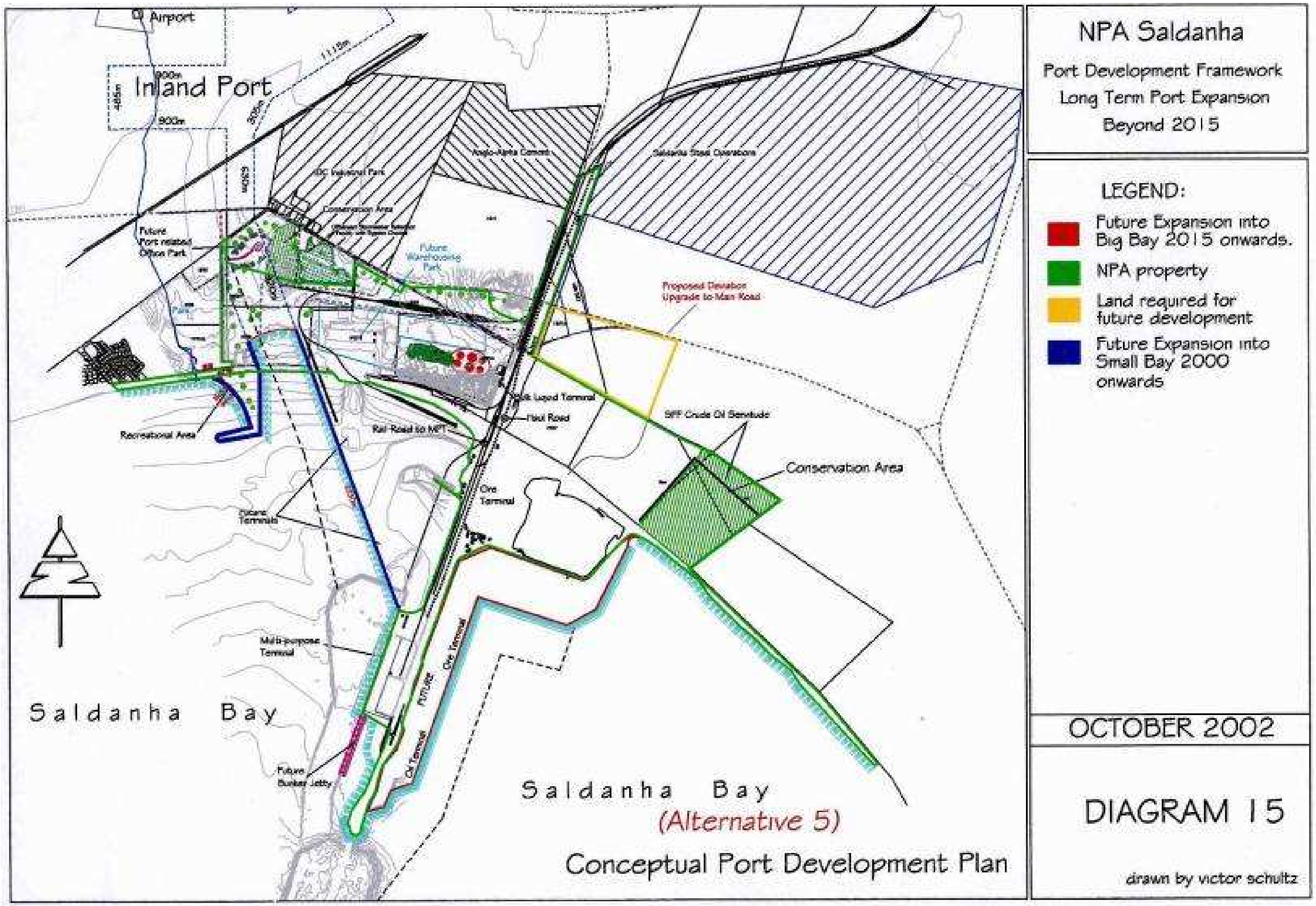

Figure 11: Port master plan - alternative layout No. 5

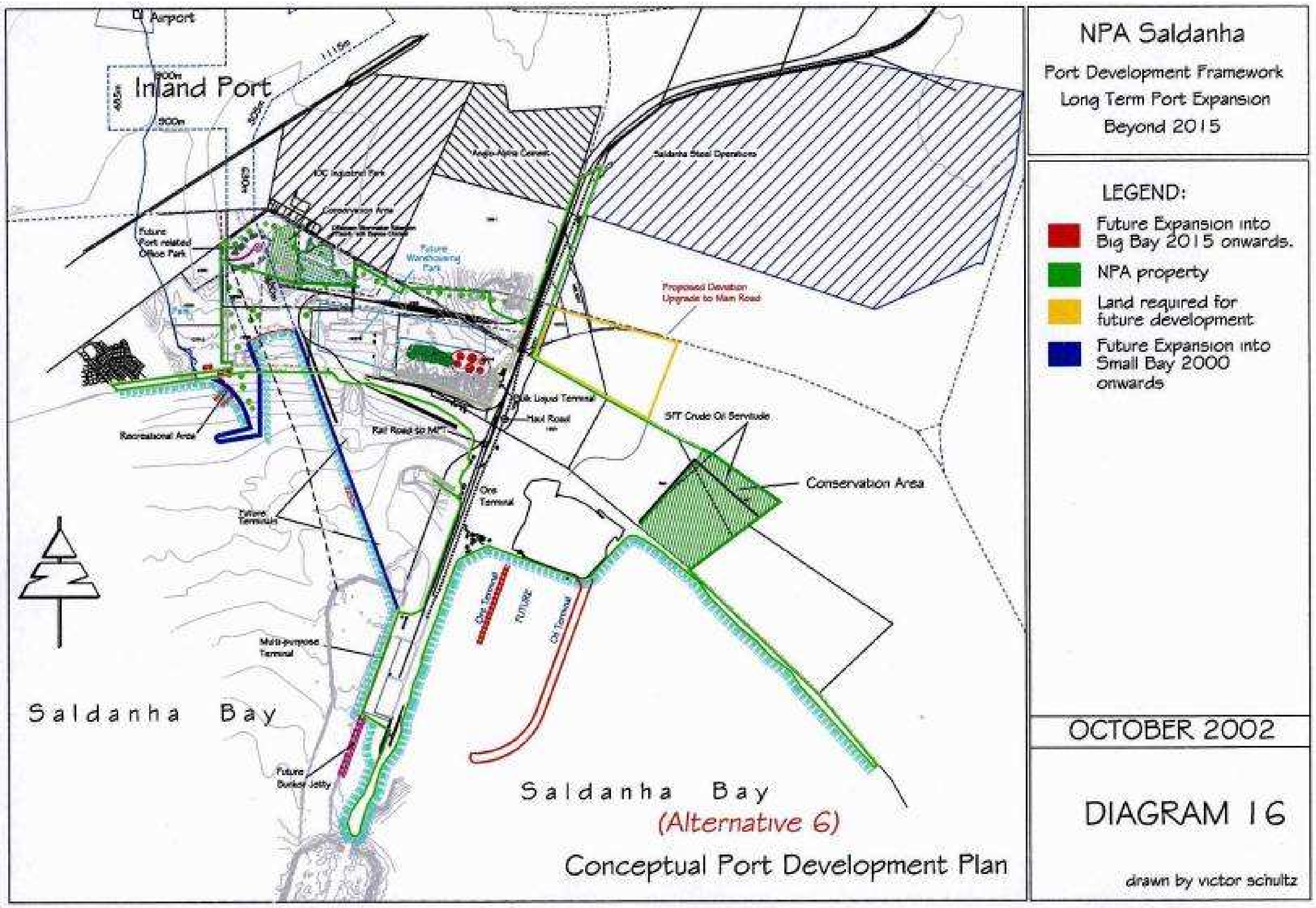

Figure 12: Port master plan – alternative layout No. 6

4.3.1.1 Port Master Plan (2005)

Figure 13 and 14 show the proposed scenarios for port development beyond 2020 (long-term); and proposed development over the next 10 years (medium-term). These were developed during the port master planning exercise in 2005.

<u>5-10 Year Plan</u>

The Port of Saldanha has the following projects planned on its 5-10 year horizon (see Table 5):

Inner Bay (Small Bay)

- Construction of a New Access Road; New NPA Administration Building and an Employee Care and Recreation Facility. These projects have already commenced and their status is as follows:-
    - New Access Road – Completed;
    - New NPA Administration Building – planned for December 2006;
    - Employee Care and Recreation Facility – planned for September 2007;
- Oil and Gas Module Fabrication Activities – the Port is in the process of negotiating a lease for the existing Mossgas site. Activities planned for this site is the fabrication of offshore oil and gas exploration modules, similar to activities that occurred in the Port in the 1990s. This is scheduled to start within the next 2 years.
- Dredging at Mossgas quay to reduce level to -8m. Completion 2007.
- Extension of existing Mossgas quay to 300m - this project is planned over the next 5 years and is currently in its pre-feasibility stages.

- Construction of one additional multipurpose quay – this project is envisioned over the next 5 years. The port is planning to add an additional berth and quay, in a southerly direction, to the existing berths currently being utilized by the multi-purpose terminal. This project is still in its pre-feasibility stages (i.e. internal investigations regarding the feasibility of embarking on the project)

- Port Industrial Park – this project will have a similar use as the industrial park in the Port of Cape Town. The project is currently in its pre-feasibility stages (internal investigations) and is planned for implementation within the next 5 years.

Outer Bay (Big Bay): The current Phase 2 expansion

- Construction of additional infrastructure to increase throughputs of iron ore as detailed in this. This project is expected to be completed within the next 5 years and is currently in its execution phases with Transnet Projects. The alternative Stockyard layouts identified for the Phase 2 expansion are all in line with the current Master Plan.

- Construction of quay space and 2 berths for import of liquefied natural gas. This project has already completed its pre-feasibility studies in 2004/2005 and these included ship motion studies, fatal flaw assessments, and an assessment of strategic impacts. This project is envisioned to be revitalized within the next 10 years. The LNG project for Saldanha is currently on hold pending the outcome of the initiative in Coega.

<u>General</u>

- Central Services Corridor - this project is planned with the Saldanha Municipality to facilitate adequate access to the port for all services (road, rail, pipelines, bulk water, electricity). This will be an expansion on the existing Haul Road and rail corridor entering the port, in conjunction with the municipality plans for industrial zoning of the areas at the back of the port. This project is in its pre-feasibility stages to be commenced within the next 5 years.

Table 5: Summary of planned activities over the next 5 - 10 years

Activity	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Employee Care Facility	■									
Oil and Gas module fabrication	■									
Dredging Mossgas quay	■									
Extension Mossgas quay	■	■	■							
Additional MPQ	■	■	■	■	■					
Industrial Park	■	■	■	■	■					
Iron Ore berths	■	■	■	■	■					
LNG terminal	■	■	■	■	■	■	■	■	■	
Central Services Corridor	■	■	■	■	■	■	■			

As most of these projects are still in their pre-feasibility stages, the exact timeframes for their implementation have not been determined at this stage.

FOR FURTHER INFORMATION ON THE MASTER PLAN FOR THE DEVELOPMENT OF THE PORT OF SALDANHA PLEASE CONTACT:

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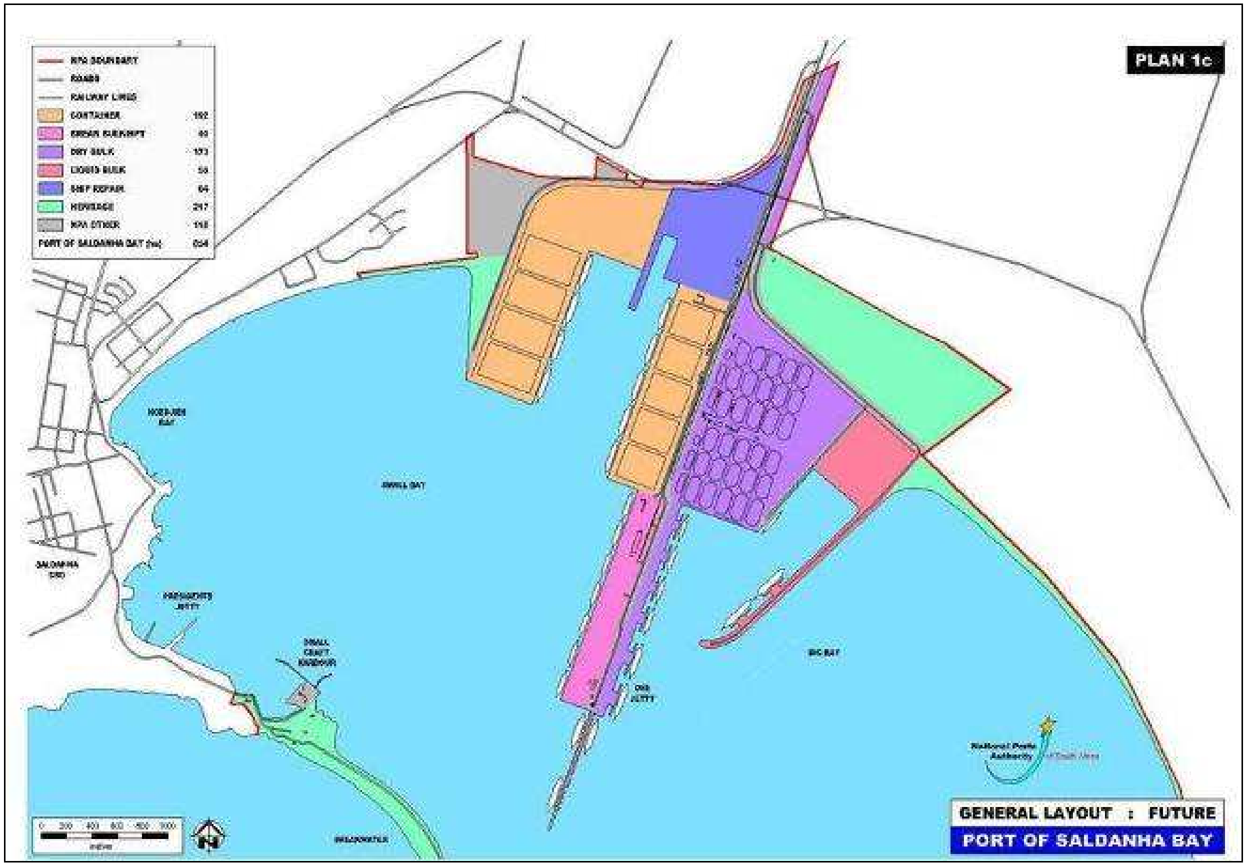

Figure 13: Proposed Port Development Scenario – Long Term (beyond 2020)

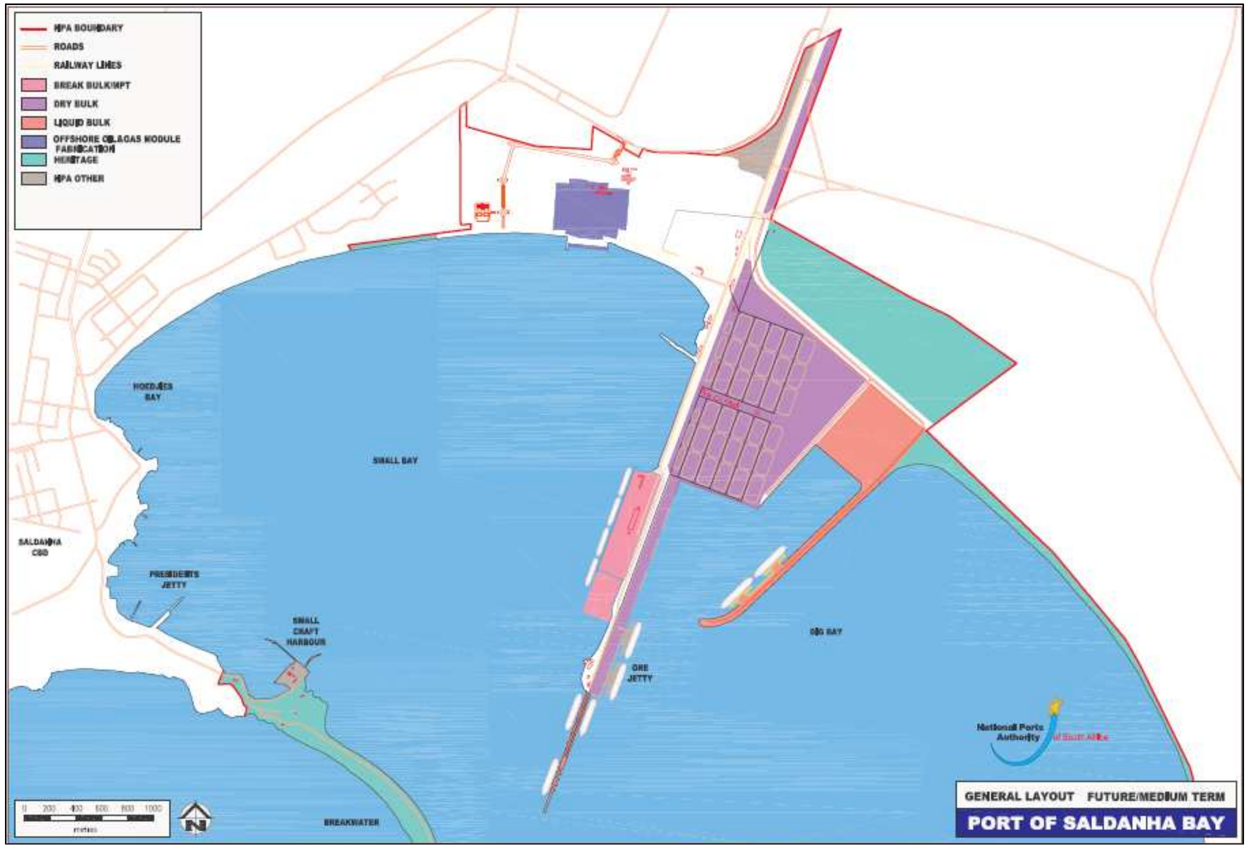

Figure 14: Proposed Port Development Scenario – Medium Term (10 years)