

**ENVIRONMENTAL MANAGEMENT PLAN  
FOR THE TOWN OF ORANJEMUND**



(Logos to be added)

## **Message from the Town CEO**

**To follow**

## **Executive summary**

## **Acronyms**

**To follow**

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## **1. Introduction**

### ***1.1 Why town EMPs?***

The Environmental Management Act 7 of 2007 rests on the principles that, amongst others:

- a) Renewable resources must be used on a sustainable basis for the benefit of current and future generations of Namibians;
- b) The public must be involved in decisions affecting their environment;
- c) Environmental assessments must be conducted for developments that affect the environment;
- d) Reduction, re-use and recycling of waste must be promoted; and
- e) Precaution must be taken to prevent environmental damage, and if it cannot be prevented it must be reduced, limited or controlled.

The abovementioned principles not only apply to industry and activities which have an obvious impact on the environment, but all activities, including ones which occur in the towns of our country. The Act is explicit in stating that these principles must be followed by government institutions as well as private persons and bodies (such as companies and organisations).

The tool of Environmental Assessment (EA) has been used effectively for over twenty years. It is a process of identifying, predicting and evaluating the socio-economic and biophysical impacts of a development on the environment prior to the development being implemented. Mitigation measures are then sought for each significant impact. These mitigation measures are described in an Environmental Management Plan (EMP), which stipulates in practical terms how they will be implemented, who will do them, and how their effectiveness will be monitored.

In the case of a town, the “development” is long since underway, and various activities of people and organisations in the town impact on the town environment and the surrounding area. Within this document there is a brief description of the impacts associated with the main activities of the town, and detailed mitigation measures for these impacts. By implementing these actions the town (and its citizens) will demonstrate its commitment to minimising its impact on the environment and ensuring a sustainable future for forthcoming generations.

In addition to the above, the coastal towns of Namibia have a responsibility to preserve the ecosystem integrity of the coastal and marine ecosystems on which they depend. The entire coastline of Namibia is protected as National Parks as a result of unique natural habitats, endemic and endangered species of plants and animals, and its tourism potential. To support this, the Namibian Coast Conservation and Management Project (NACOMA) was initiated in 2006. One of its primary objectives is to support the sustainable use of biodiversity in the coastal and marine ecosystems of Namibia.

To investigate the cumulative effects of coastal developments and activities on the environment, NACOMA commissioned Strategic Environmental Assessments (SEAs) to be conducted for the Karas and Hardap coast as well as the Erongo and Kunene coast. These assessments considered the impacts of different industrial sectors on the environment, and noted that impacts associated with towns needed to be mitigated.

NACOMA identified the coastal towns of Swakopmund, Henties Bay, Walvis Bay, Luderitz and Oranjemund as distinct growth points along an otherwise extremely sparsely populated and geographically isolated coastline.

The town of Walvis Bay went about developing an EMP in 2003 as part of the Agenda 21 Project to minimise environmental impacts in Namibia's main harbour town. The other four main coastal towns in Namibia requested NACOMA for assistance in developing EMPs of their own.

In accordance with the Terms of Reference (TORs) for this project, the EMP for each town attempts as far as possible to integrate environmental considerations into the land-use and urban planning sectors.

The intention is to keep the EMP simple and implementable. Mitigation measures are practical and achievable, and were determined through extensive stakeholder engagement.

### ***1.2 Best practice in urban Environmental Management***

As EMPs are a relatively new practice, several guidelines are available for different project types and regions. Whilst some of these guidelines are very specific and relate directly to the project or sector they were drafted for, there are a number of general guidelines and practices considered essential to any EMP.

In order to place an EMP in context, it is necessary to provide a brief summary of the project, or in this case the town and its main activities. This should include a description of the physical layout of the town, the main activities that take place, the effects these may have on the biophysical, social and economic environment, and any relevant environmental policy or legal requirements. This description should be followed with a summary of the expected impacts, both negative and positive, that require some form of management.

In order to identify the authorities responsible for implementing each component of the management plan, it is necessary to know the policy and legal framework around each issue and impact. The management plan must give specific details on which authority is responsible for each issue or impact.

When these components have been identified and clarified it is then possible to create an implementation plan, which should include:

- Objectives;
- Management actions;

- Responsibilities for the identified actions;
- Monitoring;
- Criteria and targets as performance indicators; and
- An implementation schedule.

Finally, a financial analysis should be included, indicating the funds required for implementation of the EMP. This can include a variety of activities, ranging from staff training to performance monitoring.

As there is no standard format for EMPs, The World Bank has developed their own guidelines, which are shown in the box below:

The following aspects should typically be addressed within an EMP:

- **Summary of impacts:** The predicted adverse environmental and social impacts for which mitigation is required should be identified and briefly summarised. Cross-referencing to the EA report or other documentation is recommended.
- **Description of mitigation measures:** Each mitigation measure should be briefly described with reference to the impact to which it relates and the conditions under which it is required (for example, continuously or in the event of contingencies). These should be accompanied by, or referenced to, project design and operating procedures which elaborate on the technical aspects of implementing the various measures.
- **Description of monitoring programme:** The monitoring program should clearly indicate the linkages between impacts identified in the EIA report, measurement indicators, detection limits (where appropriate), and definition of thresholds that will signal the need for corrective actions.
- **Institutional arrangements:** Responsibilities for mitigation and monitoring should be clearly defined, including arrangements for co-ordination between the various actors responsible for mitigation.
- **Implementation schedule and reporting procedures:** The timing, frequency and duration of mitigation activities should be specified in an implementation schedule, showing links with overall project implementation. Procedures to provide information on the progress and results of mitigation and monitoring measures should also be clearly specified.
- **Cost estimates and sources of funds:** These should be specified for both the initial investment and recurring expenses for implementing all measures contained in the EMP, integrated into the total project costs, and factored into loan negotiations.

*Source: World Bank, 1999*

The European Union (EU) set up a working group in 2004 to look into the Urban Environment and the development of Environmental Management Plans for cities in Europe.

Various towns and cities around the world have developed plans to mitigate environmental impacts. There are countless examples of good practice. Cape Town have developed an Environmental Management Plan which is implemented through their Environmental Management System (EMS). The system covers all Environmental Aspects identified in the EMP and provides guidance to developers and contractors within the city on how to deal with environmental impacts. It contains policies such as the Integrated Waste Management Policy, Biodiversity Strategy, Coastal Zone Management Strategy and Energy & Climate Change Strategy. A strong aspect of implementation of the EMP in Cape Town is environmental awareness and education.

(<http://www.capetown.gov.za/EN/ENVIRONMENTALRESOURCEMANAGEMENT/PROJECTS/Pages/EnvironmentalManagementSystem.aspx>)

The city of Sydney developed an Environmental Management Plan in 2007, which includes 53 specific management actions to address environmental issues relating to energy and emissions, water, waste and plants & animals. Within each issue, targets for impact reduction are set and performance of each aspect is monitored.

(<http://www.cityofsydney.nsw.gov.au/environment/Overview/EnvironmentalManagementPlan.asp>)

A frontrunner in dealing with environmental impacts is Stockholm, Sweden. Initiatives relating to waste management, renewable energy, cleaner transport and sustainable living have been implemented and have reduced the environmental impacts of the city significantly.

(<http://miljobarometern.stockholm.se/sub.asp?mp=GC&mo=1&dm=9>)

The Urban Environmental Management Programme (UEMP) is a partnership formed by eleven municipal districts in South Africa. The partnership which includes most of the large cities in South Africa considers urban environmental issues and aims to solve these collectively by pooling resources and experiences. It focuses on 6 themes:

- a) Air quality;
- b) Energy;
- c) Environmental Health;
- d) Climate change and energy efficiency;
- e) Sustainable planning; and
- f) Waste management.

This EMP takes good practice from the above cases to present a comprehensive yet practical plan to mitigate the environmental impacts of activities in and around Oranjemund.

The EMP was designed to be implemented by an independently function municipality (or town council), for that reason management actions are assigned to the municipality, and not the Town Management Company or Namdeb.

## **2. Methodology**

### **2.1 Literature review**

A literature review was conducted with the following objectives:

- a) To identify current global trends in city/town EMP development;
- b) To identify innovative mitigation measures for urban environmental impacts.

### **2.2 Site visits**

A site visit was conducted in and around the town to identify possible environmental issues.

It included the following areas:

- Light and heavy industrial areas;
- Transport infrastructure;
- High density commercial properties;
- Sewage treatment plants;
- Landfill sites;
- Parks and green spaces; and
- Areas with sensitive or protected biodiversity.

### **2.3 Stakeholder engagement**

The ToRs correctly require stakeholder engagement as early as possible in the process. This is so that key institutions and individuals can participate meaningfully from the start and so that the development of the EMP can benefit from their knowledge and insights. Providing credible information on an ongoing basis and running a legitimate process are essential prerequisites to secure public buy-in to the process.

For the above reasons a public meeting was conducted on 19 July 2010 18h00 at the Oranjemund Recreation Club.

Stakeholders were identified and alerted of the meetings using the following means:

- Advertisements and news articles (print and radio) in all Namibian newspapers calling for stakeholders to attend public meetings or contact SAIEA;
- E-mail invitations were sent to stakeholders who:
  - Are on the NACOMA stakeholder database;
  - Are on the mailing list of the Namibia Environment and Wildlife Society (NEWS);
  - Were identified as stakeholders in various Environmental Impact Assessments (EIAs) or Strategic Environmental Assessments (SEAs) at these coastal towns;
  - Were identified as representatives of local, regional and national authorities (government and parastatal);

The NACOMA focal point alerted stakeholders telephonically and through personal and e-mail invitations and placed advertisements at prominent sites within the town.

The public meeting was used to introduce the idea of a town EMP and motivate its necessity, identify key environmental issues, prioritise those issues, and identify some initial solutions for the key issues.

In addition to the public meeting a number of focal group meetings were held to further identify environmental issues, and further discuss specific mitigation measures with affected stakeholders or technical experts. The following focus group meetings were held:

19 July 2010	Oranjemund Town Management Company	Orientation, discussion of issues, EMP format and implementation
20 July 2010	Sperrgebiet National Park Chief Warden	Impact of town activities on the Sperrgebiet National Park
20 July 2010	Local recycling company	Extent and viability of recycling in Oranjemund and Luderitz

### ***3. Legal and institutional overview***

This EMP takes cognisance of all relevant policies and laws which may influence or regulate certain aspects of town activities relating to the environment. These are briefly discussed below:

#### **Environmental Impact Assessment Policy**

Namibia's Environmental (Impact) Assessment Policy for Sustainable Development and Environment Conservation was approved by Cabinet in 1995. This policy requires that all policies, programmes and projects, as listed in the policy, whether they are initiated by the government or private sector, should be subject to an Environmental Impact Assessment (EIA). The Government of Namibia recognises that EIAs are key tools to further the implementation of a sound environmental policy which strives to achieve Integrated Environmental Management (IEM). The Government also recognises that EIAs seek to ensure that the environmental consequences of development projects and policies are considered, understood and incorporated into the planning process. The purpose of the Policy is seen as informing decision makers and promoting accountability, ensuring that alternatives and environmental costs and benefits are considered, promoting the 'user pays' principle, and promoting sustainable development

#### **Environmental Management Act 7 of 2007**

This Act was gazetted on the 31<sup>st</sup> of December 2007. It has not yet come into force. Its purpose is to promote the sustainable management of the environment and the use of natural resources by establishing principles for decision-making on matters affecting the environment; to establish the Sustainable Development Advisory Council; to provide for the appointment of the Environmental Commission and environmental officers; to provide for a process of assessment and control of projects which may have significant effects on the environment; and to provide for incidental matters. The Act gives legislative effect to the Environmental Impact Assessment Policy (mentioned above).

#### **Draft Integrated Pollution Control and Waste Management Bill**

The purpose of this Bill is to regulate and prevent discharge of pollutants to the air, water and land in Namibia, and to enable the country to fulfil its international obligations in this regard. The draft Bill forbids any person from discharging or disposing any water without a water pollution licence (aside from the discharge of domestic waste from a private dwelling or the discharge of pollutants or waste to a sewer or sewage treatment works).

#### **Water Act, 54 of 1956**

Of relevance to this report is the following;  
the Act makes it a criminal offence to:

“Pollute fresh water or the sea in a way that makes the water less fit for any purpose for which it is or could be used by people, including use for the propagation of fish or other aquatic life, or use for recreational or other legitimate purpose.”<sup>1</sup>

This Act requires that water used for industrial purposes be purified before it is returned to a public stream or the sea, so as to conform with requirements established by the Minister of Agriculture, Water and Rural Development, but can be exempted from doing so, subject to certain conditions. The Minister in this instance may issue a permit to allow the discharge of waste water, effluent or waste in an un-purified or semi-purified state into a public stream, subject to such conditions that it does not cause pollution of “public or other water, including sea water” or provided that the discharge point is sufficiently close to the sea that no person will be prejudicially, and no aquatic or marine life detrimentally, affected by such discharge.

### **Overview of Development Planning Legislation**

There is no legislation in Namibia that requires the preparation of a coherent, national and regional land use framework but it is envisaged that this will be introduced when the Draft Urban and Regional Planning Bill is enacted. Currently the establishment of towns and the subdivision of land are regulated by the Townships and Division of Land Ordinance of 1963 while the development and application of town planning schemes is regulated by the Town Planning Ordinance 18 of 1954. Both these Ordinances must be read with the Local Authorities Act 23 of 1992.

### **Institutional Arrangements**

The National Planning Commission is responsible for coordinating and direction national development planning<sup>2</sup> while individual ministries are responsible for their own sector planning. The Ministry of Regional and Local Government and Housing and Rural Development (“MRLGHRD”) is responsible for spatial land use planning at a regional level. The Ministry of Lands and Resettlement (MLR) is in charge of land use planning for communal land in rural areas. State owned land is controlled by the Ministry of Works, Transport and Communications but the Ministry does not routinely undertake land use planning.<sup>3</sup> The Ministry of Environment and Tourism has on occasions undertaken land use planning in respect of areas designated for nature conservation such as the Skeleton Coast Park. The new Dorob National Park, which surrounds Swakopmund and extends to the Skeleton Coast Park (now also forming part of the new Namib Skeleton Coast Mega Park), included extensive planning in the development of its Park Management Plan.

### **Local Authorities Act 23 of 1992**

This Act provides for the determination of local authorities and the establishment of local authority councils. It also sets forth the powers, duties and functions of such councils. Local authorities are given wide-ranging powers such as, “to supply water to residents; to provide and maintain sewerage and drainage systems; to provide waste removal services; to supply

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<sup>1</sup> Section 22.

<sup>2</sup> Namibia published its first National Development Plan in 1996.

<sup>3</sup> Coastal Profile of the Erongo Region – August 1999, page 134.

electricity or gas to residents; to establish and operate sand, clay, stone or gravel quarries; and to promote tourism.”<sup>4</sup>

If a local authority council discharges water from any waterworks or water main, or any storm water, into a public water course, it must at all times keep the natural channel of banks (up to the 50 year flood-line) clean and free from any artificial or natural obstructions which are likely to interfere with the flow of the watercourse or create a danger from flood waters (other than buildings lawfully erected before the commencement of the Act).<sup>5</sup> The local authority council may also require private landowners to do likewise and if they fail to do so, it may take the necessary measures and recover the cost from the person concerned.

A major environmental protection shortcoming is that the Act does not impose any specific obligation on local authorities to address environmental conservation in the coastal and marine areas to promote sustainable development. However, it does grant municipalities certain powers that can be used for these purposes. For example, a local authority may, after consultation with the Minister, make regulations by notice in the Gazette, in respect of “the supply, distribution and use of water in its local authority area including the protect from pollution of water;”<sup>6</sup> and “the restriction, regulation and control of the use of common pasture and townland, including a prohibition on the removal of soil, sand, vegetation, etc from such land.”<sup>7</sup>

### **The Town Planning Ordinance 18 of 1954**

The Town Planning Ordinance makes provision for the preparation and carrying out of town planning schemes. The Ordinance aims to ensure that every town planning scheme shall have for its purpose the coordinated and harmonious development of the area to which it relates “in such a way as will most effectively tend to promote health, safety, order, amenity, convenience and general welfare, as well as efficiency and economy in the process of development and the improvement of communications.”<sup>8</sup>

### **Draft Urban and Regional Planning Bill and Regulations**

It is envisaged that the current system of land use planning and development controlled in Namibia will be comprehensively reformed by the enactment of the draft Urban and Regional Planning Bill and regulations made under it.<sup>9</sup> The Bill provides for the establishment of national, regional and urban structure plans, and the development of zoning schemes. It also deals with a variety of related land use control issues such as the subdivision and consolidation of land and the establishment and extension or urban areas\

### **Namibian Ports Authority Act 2 of 1994 / Regulation in Terms of the Port Authority Act**

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<sup>4</sup> Section 13.

<sup>5</sup> Section 19.

<sup>6</sup> Section 94(1)(a)(viii).

<sup>7</sup> Section 94(1)(z)(ad).

<sup>8</sup> Section 1(1).

<sup>9</sup> Bill 2003 version

The Act establishes the Namibian Ports Authority (NPA) to undertake the management and control of ports and lighthouses in Namibia and the provision or related facilities and services.

**Marine Traffic Act, 2 of 1981**

The main purpose of the Marine Traffic Act is to regulate marine traffic in Namibia and it deals with a range of matters such as the right of innocent passage through Namibian waters. The Act empowers the Minister of Works, Transport and Communication to make regulations regulating marine traffic in the territorial sea and internal waters, including the prescribing of sea lanes and the traffic separation schemes for ships in general or for any class of ship or for ships carrying nuclear or other dangerous or noxious substances.<sup>10</sup>

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<sup>10</sup> Section 14(a).

## **1. Socioeconomic baseline**

### ***4.1 Population and demographics***

Established in 1936, the town infrastructure is still owned by Namdeb, though plans for proclamation are advanced. As the town is still a restricted access mining town, permits are required before access is granted and most residents are employees are employed by Namdeb or service providers of the mining group, giving the town an estimated population of 9000 people.

Due to the mining town nature of the town, there are similar proportions of younger and older people, with few residents over the age of 60. There is also a higher ratio of males to females, and a lower percentage of the population in the high school/tertiary education age bracket.

It is expected that the town will soon be proclaimed, allowing the general citizenry to migrate to Oranjemund. With people hoping to take advantage of possible economic opportunities, it is possible that there will be a population increase, most likely within the 20-39 age group.

Employment and income levels:

As Oranjemund is still a closed town, requiring a permit for access, people living within the town boundaries are either employees of Namdeb or their dependants. This would imply low levels of unemployment, as everyone there is either employed to gain access, or the dependent of an employee and is not actively looking for employment.

Education levels:

As the majority of people residing in the town are employed with Namdeb, with a high percentage of professional people being required for operations, it is a fair assumption that the literacy rate is relatively high within Oranjemund. It should be noted that this literacy level is not a fair indication of the region's literacy, as access to the town is restricted.

Health status:

Employees and contractors are medically screened before they enter, and their health is maintained within the town by the Namdeb funded medical services. Medical facilities are of a high quality.

### ***4.2 Social Infrastructure***

Health:

The Namdeb run medical facility is a 37 bed, modern and fully equipped hospital. There is a 24hour Emergency Service with an Out Patient and Casualty Department and a fully equipped operating theatre. The hospital employs 3 full time medical professionals, with a total 61 other staff. There is a pharmacy that operates for both In and Out patient use.

Services within the hospital include a Primary Health Clinic, laboratory, radiology and x-ray department, physiotherapy and Dental Clinic.

Education:

Oranjemund Private School currently includes a pre-primary and grades 1 through 7. Grades 8 and 9 were added in 2009, previously children above grade 7 were transported to Alexander Bay to attend high school, or sent elsewhere to boarding schools. Current plans include the introduction of grade 10 in 2011, grade 11 in 2012 and grade 12 in 2013.

#### Public Amenities:

The town boasts several facilities for public recreation. This includes several fields for soccer, rugby, cricket, hockey, jukskei and bowling. As well as the fields, there are courts for squash, badminton and tennis. There is also a public swimming pool, a golf course, off-road course and shooting range. These are currently maintained by Namdeb and are in good condition.

#### Housing:

The town borders enclose 2500 ha of land, with 2002 surveyed erven, and surrounded by the Sperrgebiet National Park. Currently there are over 700 single accommodation units, 1017 houses and over 1700 residential plots, with more than 30 serviced residential plots available. There are no informal settlements, with all developments pre-planned and approved by Namdeb. Being a closed town, it was not possible to enter the town without the proper clearance, limiting the ability for the creation of informal settlements.

With the proclamation of the town, it can be expected that this will change and informal settlements may begin to appear within the town limits. However, due to the existing nature of the town, the expansion of informal settlements may not be as prolific as in other towns and areas.

#### ***4.3 Economic activities (current situation and plans)***

##### Diamond Mining:

Diamonds, first discovered in 1880, have dominated the economy within the Karas Region, with Namdeb being the principal mining operator in the area. Namdeb remains a large contributor to the Namibian economy through mineral taxes. With 95% of diamonds mined being of gem-quality, it compensates for the low number of stones found per unit ore mined. Onshore resources have practically been depleted, which led to offshore mining beginning in the 1990's.

##### Retail:

There are currently 160 formal and informal businesses registered in Oranjemund. This includes a Spar, Woolworths, Pep Store, FurnMart, Lewis and Pupkewitz, as the larger retail businesses. There are a number of smaller businesses, including cafes, a nightclub and flower shop, providing Oranjemund with a full range of basic retail services.

##### Services:

There are a range of services available within the town. These range from small businesses, such as hairdressers and car washes, to larger scale service providers, such as Nashua and First National Bank. While there is not a great range of choice when it comes to certain services, most services can be obtained within the town.

##### Lifestyle investments:

Currently there are few opportunities for lifestyle investments within Oranjemund, due to the closed nature of the town. However, with the impending proclamation, as well as the newly declared Sperrgebiet National Park, an increase in tourists and holiday makers can be expected.

An initiative currently being investigated involves attracting foreign investment for the development of a golfing estate at the current golf course.

## 2. Biophysical baseline

### 5.1 Climate

#### Wind:

The climate of Oranjemund is dominated by its proximity to the South Atlantic high pressure cell which is situated offshore to the west and south, acting like a giant fan blowing air from the south and driving the Benguela Current northwards. Calm conditions occur rarely (only 6% of the time), and winds blow predominantly from the south and to a lesser extent from the southwest and west (NamPower 2004). Winds typically pick up during the course of the day and are strongest in the afternoon and early evening. Occasional off-shore (easterly) winds blow warm and dusty during the winter months.

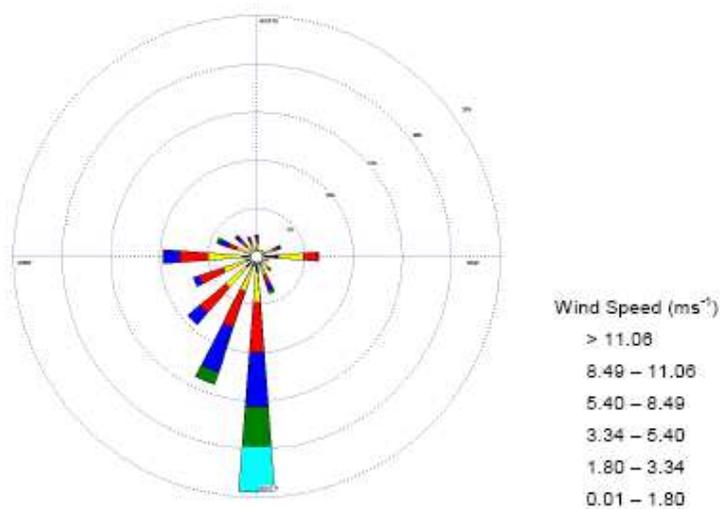


Figure Wind rose for Alexander Bay (adjacent to Oranjemund on the South African side of the Orange River) for 2000-2001 (from Nampower 2004).

#### Temperature:

Average temperatures are mild throughout the year, with slightly cooler days in winter. The cool dry air is maintained by the South Atlantic pressure cell, and cold fronts moving up the coast from the Cape in winter contribute to occasional cold snaps. The average daily maximum temperature recorded over 27 years up to 1990 in Alexander Bay in summer was  $23^{\circ}\text{C}$  with the highest temperatures just over  $40^{\circ}\text{C}$  (NamPower 2004). In winter the average maximum was two degrees lower. Minimum temperatures during June, July and August almost reach zero degrees but do not drop below that (Mendelsohn et al 2002).

Figure Insert Oranjemund temperature graph from Atlas p80

#### Rainfall:

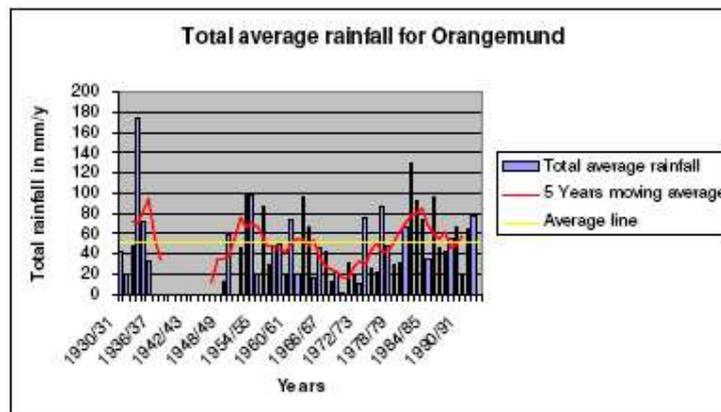
Rainfall records are summarized in Table xx, and shown graphically in Figures xx (ERB 2010). Rain falls predominantly in the winter but summer rain is not uncommon, consequently the average rainfall of about 50 mm is higher here than along the rest of the

Namibian coast. The very high coefficient of variation (66%) is a reflection of the wide variations around the average line shown in Figure xx.

Table xx. Summarised rainfall data for Oranjemund (ERB 2009).

Years of rainfall records	1930 – 1994
Missing years	14 yrs
Average annual rainfall	52 mm
Median annual rainfall	46 mm
Maximum rainfall	174 mm in 1933/34
Minimum rainfall	1 mm in 1929.30
Highest rainfall months	February - October
Coefficient of variation	66%

Figure xx Long term rainfall records from Oranjemund (ERB 2009).



### 5.2 Status of surrounding land

Oranjemund lies on the southern border of Namibia so South Africa lies to the south on the opposite side of the Orange River. While there are coastal diamond mining operations at Alexander Bay, the town immediately south of Oranjemund, there is not the same restriction on access as exists in the Sperrgebiet.

The town of Oranjemund is completely enclosed by the Sperrgebiet to the east and north, South Africa on the opposite side of the Orange River, and the Atlantic Ocean to the west. Access is therefore limited in all directions.

The Orange River lies in a very wide, very shallow valley as it approaches the mouth. The mouth is a very narrow outlet to the sea which is only broken wider during heavy flows (once every few years). Upstream to the Oppenheimer Bridge the river course is about 1 kilometre wide and comprises low sand islands, reed swamps and marsh vegetation. This area is classified as a Ramsar site i.e. a Wetland of International Importance, due to its concentration of birdlife which are attracted by the diversity of microhabitats in the wetland system. The Pink Pan, lying between the mouth and the town, also attracts much birdlife (shallow saline pan waders and flamingoes). These areas around the river and mouth constitute almost the only places where residents of Oranjemund have access to the outdoors and open land.

Here a map of the town and surroundings to show the proper extent and boundaries of the town, the Ramsar site, Spg boundary, Mining Area 1, etc.

A low isolated hill named Swartkop lies immediately north of the main road entering town from the east, close to the Oppenheimer Bridge. The hill supports a relatively high abundance and diversity of succulent plants and is informally zoned for conservation, with a laid out trail at the top directing visitors to a viewing site over the Orange River, and to appreciate the numerous succulent plants. The reservoir at the top is now converted into an environmental awareness centre.

### ***5.3 Surrounding vulnerable and important habitats and their biodiversity***

The places described above make up much of the important habitats within a radius of about 20 km of Oranjemund.

The Orange River and the flanks of its wide valley support a variety of plants and animals that do not occur elsewhere in the Namib or Namibia (Pallett 1995). The river forms a linear oasis through the southern Namib, and the mouth is one of the most important coastal wetlands in southern Africa. Mammals of conservation importance linked to the river and mouth include Cape clawless otter and water mongoose (Pallett 1995). The mouth supports significant proportions of the world populations of Cape Cormorants and Hartlaub's Gull, and more than 1% of the southern African populations of seven other bird species: Damara Tern, black-necked grebe, lesser flamingo, chestnut-banded plover, curlew sandpiper, swift tern and Caspian tern. Up to 26,000 birds, of 56 species, have been counted at the Orange River mouth wetland in the peak month of December. The Orange River mouth furthermore contrasts favourably with other coastal wetlands in southern Africa, such as Walvis and Saldanha Bays, which are subject to heavy industrial, harbour or recreational use. Clearly, this wetland has very high conservation value.

The coastal belt, from the high tide mark to about the 300 m contour, supports hummock vegetation with some notable plants. **See Kudu gas EIA**  
Also found in this habitat is the desert rain frog (*Breviceps macrops*) which relies on fog for its moisture. Its range is confined to the sandy coastal belt of the northern Cape and Sperrgebiet, which falls almost entirely within diamond mining territory. This species is classified as Endangered (Griffin 2005)

### ***5.4 Important ecological processes***

The main determinants of ecological functioning in the southern Namib are

- Wind, shaping the sandy substrate and driving the northward Benguela Current and upwelling system in the sea;
- Water flow in the Orange River, providing the habitat and food for wetland birds in the lower reaches and mouth;
- Mobility of large animal populations (more pertinent to inland areas of the Sperrgebiet than to the Oranjemund area).

The one issue of concern is abstraction of water from the Orange. Cumulatively with the many other irrigation schemes and mines pumping water from the Orange, as well as the enormous demand for water in the upper South African parts of the Orange River basin and

regulation by large dams, there are very significant impacts on the ecological functioning of the Orange River mouth (TDA report).

The other ecological processes are largely unaffected by developments in Oranjemund.

### 3. Key social and environmental issues

#### 6.1 Water

Water for Oranjemund is extracted from the Orange River. As the town is not operated independently from the mine, the extraction is fed off the mine in-take. Water is not metered in Oranjemund, therefore citizens are unaware of the water usage, and according to sources quite ignorant of the consequences of water wastage. “If we don’t use the water from the Orange River it just runs into the sea and is wasted..” was one resident’s argument. This attitude speaks of ignorance for the ecological flow requirements of the Ramsar protected Orange River Mouth.



Non metering of water makes demand management difficult.

Sewage effluent is treated at an effective and well operated activated sludge treatment plant. Wastewater from the plant is allowed to evaporate or flow into an artificial wetland area adjacent to the plant. This creates an oasis which attracts desert animals.

Oranjemund has a number of parks and green areas, which are irrigated with fresh-water. An opportunity exists to use the sewage effluent greywater for this purpose.

#### 6.2 Pollution and Waste management

Solid domestic waste management in Oranjemund is of concern. The landfill site is not adequately fenced, allowing scavenging animals to enter it at will. Although some separation of waste is visible, this is applied in an ad-hoc manner.



Scavenging gemsbok at the Oranjemund landfill site



Scavenging jackal and pied crows at the Oranjemund landfill site

A local entrepreneur has initiated a recycling business, which relies on after-the-fact recycling as no recycling of domestic waste at source takes place.



A local entrepreneur is collecting and baling recyclable waste for sale to recycling businesses

### ***6.3 Energy consumption***

As with water, electricity consumption for Oranjemund Town is combined with use by the mine. Consumption by individual households is not metered, and therefore usage is unknown. As with water usage, this may be problematic as residents are unaware and apathetic of their energy usage, and do not apply saving measures.

### ***6.4 Green spaces/public amenities***

Surrounded by an inhospitable and unforgiving surrounding environment, Oranjemund serves as a green oasis for local residents. A number of parks and gardens are maintained by the town, and tall trees (mostly exotic) line the streets in order to create a cool and lush ambience. A number of the parks contain children's playgrounds which are well maintained.



A large network of parks adds to sense of place in Oranjemund, but are water intensive and dominated by alien species

### ***3.5 Transport***

Transportation within Oranjemund is primarily (or solely as stated by some stakeholders) by vehicle. Although most industry, schools and shops are within walking or cycling distance from residences, very little cycling or walking takes place. There is an opportunity to promote cycling and to develop a cycling lane network.

### ***3.6 Habitat destruction***

As stated in chapter 5 Oranjemund is surrounded by a unique and sensitive natural environment with the Orange River valley, the Ramsar site mouth, and inselbergs of the Sperrgebiet being most notable. Various activities of the town are impacting on these habitats in some way:

a) **Poaching of wildlife in surrounding areas**

Populations of wildlife (mainly oryx, springbok and ostrich) occasionally occur in the area surrounding Oranjemund. Poaching of wildlife by residents of the town may occur for commercial or self-sustaining reasons.

b) **Litter from the town and waste from the landfill site**

Litter from the town and landfill site (particularly plastic bags) was observed in the surrounding desert. It has the potential to choke or poison wildlife that scavenge on it, or disturb invertebrates and vegetation in the desert. Scavenging animals further have the potential to spread diseases from the landfill site to the town or surrounding areas.

c) **Spread of alien invasive species**

The Sperrgebiet is one of the few ecosystems in Namibia that are relatively free of invasive alien plants and animals (Cooper pers.comm) and the only areas where they occur, are where human activity is present i.e. mining, roads and areas adjacent to settlements such as Oranjemund.

### ***3.7 Sense of place***

Oranjemund has for its entire existence been a mining town. Hence its layout is practical and neat, with conveniently located facilities and uniform, practical architecture moulded on a number of 20<sup>th</sup> century mining towns. Its discerning feature from other Namibian coastal towns is the presence of a number of parks with lush green vegetation. Although very water dependent, the gardens have given the town the sense of “an oasis in the desert”.

### ***3.8 Climate Change Adaptation***

**Sea-level rise (SLR) and Beach erosion.** The town currently lies some distance from the sea and is not (with the exception of the yacht club) considered susceptible to SLR. However, rising seas and increasingly intense high water events will place added stress on the sea walls established by CDM and Namdeb, which, if they are breached, will move the current coastline closer towards its natural position (approximately 1.7km from the town).

**Flooding of the Orange River and Oranjemund’s future water supply** The golf club is highly vulnerable to floods. Currently vast quantities of water are abstracted straight from the Orange River to meet domestic demand and to service large public spaces. Water monitoring in the town is non-existent and grey water is not used.

The lower Orange sub-basin has been identified as a potential ‘hotspot’ where anticipated climate change is likely to have wide-ranging water resource management implications (Schultze *et al* 2005). Upstream water demand from the Orange will increase as a result of growing demand in South Africa and Lesotho. This will be severely exacerbated by reduced runoff (as predicted for climate change<sup>11</sup>). Consequently, the amount of water reaching the lower Orange basin will diminish over time.

**Recommendations.** This EMP recommends that:-

- The Oranjemund town council introduces strict water saving strategies to prepare for future water stress that is likely to occur even in the absence of climate change.
  - A grey water treatment plant must be developed – for use on all public green spaces and sports facilities.
  - Water wastage and losses must be reduced to the barest minimum. This can be achieved through improved maintenance of all water distribution infrastructure.
- The town council commissions a specialist, independent, SLR risk assessment as suggested in Section 9.11(f). A decision needs to be made on whether or not to maintain the sea walls and also to set appropriate set-back lines for infrastructure (roads and buildings).

Contour maps (10 cm intervals) are developed which will help determine those areas that are most vulnerable to increased incidents of flooding during storm events.

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<sup>11</sup> Kiker *et al* (1999) determined that a 12 – 16% decrease in outflow could occur at the Orange/Senqu river mouth by 2050 as a result of climate change.

#### **4. Environmental Quality Objectives (EQOs)**

An Environmental Quality Objective (EQO) is typically a non-enforceable goal, which specifies a target for environmental quality which, it is hoped, will be met in a particular environment. If EQOs are set by regulation, they are usually referred to as Environmental Quality Standards. For the purposes of this EMP, we will use the term EQO, whether the objective is defined by 'society', policy, law or International Agreement(s).

In some cases, EQOs are a vague form of generally desirable objectives, but in other cases, they might be concrete quantitative measures. Wherever possible, they should be acceptable to all key stakeholders, quantifiable, verifiable and outcomes oriented.

Each EQO contains a vision which describes an ideal state for management of that particular aspect of the environment in or around the town. It further specifies the root causes of impacts relating to the environmental aspect.

The EQO further describes key desired outcomes required to attain the stated goal, and specifies management targets and measurable indicators to effectively monitor achievement of the outcomes over time. Monitoring of the indicators is critical to driving implementation of management actions in response to the targets set in the EQOs.

The selected nine EQOs contained within this EMP were developed in response to the key environmental concerns which were identified through stakeholder engagement, physical inspection and assessment of the effects of activities of the town on its the environment. They are:

- Waste management;
- Water management;
- Energy management;
- Climate change adaptation;
- Sand and gravel mining;
- Traffic management;
- Open space management
- Biodiversity conservation; and
- Sense of place.

Figure 4 below describes the context within which the EQOs were developed.

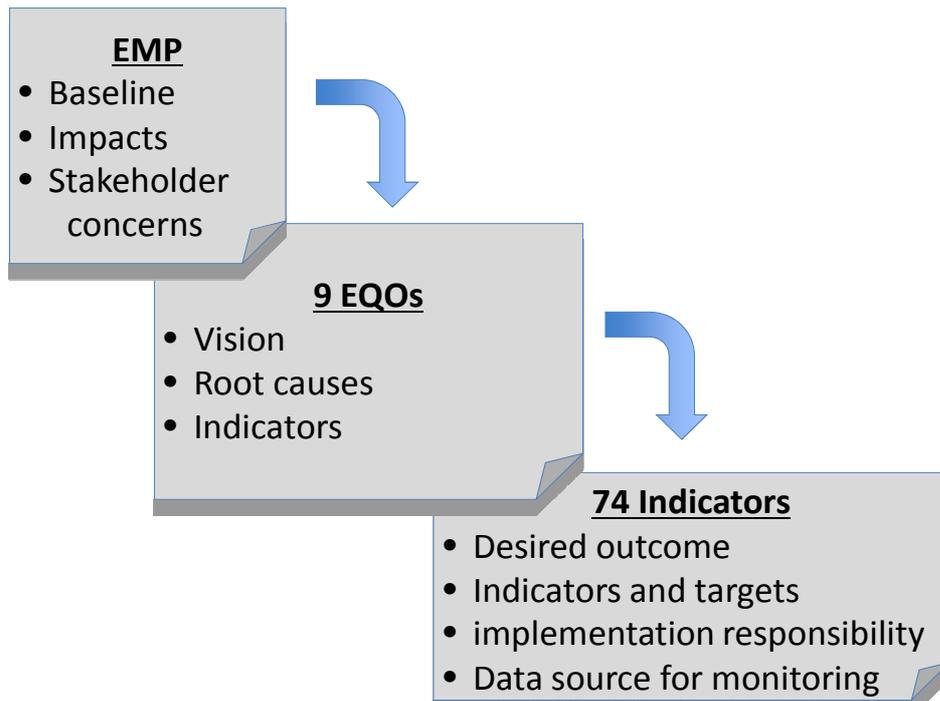


Figure 4: Context of the EQOs

The above figure illustrates that in total 74 indicators were selected to monitor performance of the implementation of the town EMP against desired outcomes for the nine selected EQOs.

Although Oranjemund is not yet a proclaimed town, the EMP mentions the town “Municipality” in anticipation of the proclamation being achieved in due course.

#### 4.1 Waste management

##### Problem statement:

1. Volumes of waste are escalating, as well as littering and illegal dumping
2. Recycling at source is applied at very low levels.

##### The above problems cause the following environmental and socio-economic impacts:

- Human health & wellbeing
  - Residents in informal settlements live in unhygienic conditions because of informal waste dumping in the township, thus exposing them to disease;
  - Human scavengers on the landfill site are exposed to serious health and safety risks (but are effective in recycling waste)
- Economic impact
  - Increased diseases (especially in informal settlements) place strain on communities and health infrastructure;
  - Increased waste volumes require additional removal and disposal costs
  - Economic benefits from recycling of waste not being realised to their fullest potential
- Town image
  - Dirty town and surroundings undermines Oranjemund's tourism and investment potential
- Biodiversity
  - Various types of wildlife at risk if they forage on waste (jackal, hyeana, crows, gulls)

##### ROOT CAUSES OF THE PROBLEM

1. Human influx and limited economic opportunities result in growing informal settlements
2. Public inertia for waste minimisation and recycling at source – caused by inadequate incentives and/or disincentives

##### VISION

**Oranjemund will manage waste in a sustainable, effective, equitable and efficient manner so as to minimise social, health, environmental and economic impacts.**

Desired outcome	Performance indicator and target	Party responsible for implementation	Data source
Waste generation at household and business level is minimised	<b>Target:</b> Waste volumes from household and commercial properties reduced by 30% per capita compared to 2010		

Desired outcome	Performance indicator and target	Party responsible for implementation	Data source
	<p>baseline</p> <p><b>Indicators:</b></p> <ul style="list-style-type: none"> <li>• Household and commercial waste recycling system in place and operating</li> <li>• Landfill recyclers are trained and supported in removing recyclable materials from the landfill site</li> <li>• An awareness campaign is developed and implemented among businesses and residents, encouraging waste separation and composting</li> </ul>	<p>Municipality supported by public and commercial businesses, NAMDEB</p> <p>Municipality and local business</p>	<p>Physical inspection</p> <p>Campaign exists</p>
Littering is minimised	<p>Target: The attractiveness of Oranjemund and surroundings is not degraded by litter in the town and its surrounds</p> <p>Indicator:</p> <ul style="list-style-type: none"> <li>• Waste blown from the landfill site is contained by suitable infrastructure (fencing) and picked up on a weekly basis</li> <li>• A highly visible anti litter campaign is developed</li> <li>• Waste disposal bins are available in all public areas of Oranjemund, and emptied daily</li> <li>• The current cleanup campaign (Project</li> </ul>	<p>Municipality</p> <p>Municipality / NACOMA Municipality</p> <p>Municipality / NAMDEB</p>	<p>Fencing in place</p> <p>Municipality reports</p> <p>Project report NAMDEB meeting minutes</p>

Desired outcome	Performance indicator and target	Party responsible for implementation	Data source
	<p>Shine) is expanded and supported by local business (NAMDEB)</p> <ul style="list-style-type: none"> <li>• Fines are imposed for littering or waste dumping in municipal areas</li> <li>• “Green ambassadors” are appointed to create awareness and enforce fines</li> <li>• Plastic bags are sold in all retail stores instead of given free of charge</li> </ul>	<p>Municipality</p> <p>Municipality / residents</p> <p>NAMDEB / Retailers</p>	<p>Green ambassadors appointed</p> <p>NAMDEB meeting minutes</p>
<p>All residential and commercial areas have adequate waste storage infrastructure and removal services</p>	<p><b>Target:</b> Illegal dumping is minimised as all residents have easy access to disposal facilities which are regularly emptied</p> <p><b>Indicators:</b></p> <ul style="list-style-type: none"> <li>• No illegal dumping of waste</li> <li>• Waste removal services include all formal and informal areas and waste is removed at least once a week according to a well publicised schedule</li> <li>• Waste storage skips are available on every street corner in DRC</li> </ul>	<p>Public &amp; commercial business</p> <p>Municipality</p> <p>Municipality</p>	<p>NCCI, Physical inspection</p> <p>Municipal waste management plan</p> <p>Physical inspection</p>
<p>Type specific waste disposal facilities are established</p>	<p>Target: Waste is separated and disposed in categorised disposal sites (e.g. landfills)</p> <p>Indicators:</p>	<p>Municipality</p>	<p>Physical</p>

Desired outcome	Performance indicator and target	Party responsible for implementation	Data source
	<ul style="list-style-type: none"> <li>• Waste disposal facilities for the following waste types are developed:               <ul style="list-style-type: none"> <li>○ Household waste</li> <li>○ Garden refuse</li> <li>○ Building rubble</li> <li>○ Scrap metal</li> <li>○ Hazardous waste</li> </ul> </li> </ul>		inspection
Waste disposal sites are adequately managed	<p>Target: Waste disposal sites are effectively managed to minimise the risk of odours and disease, scavenger access (mammal &amp; bird) and safety to workers or people in surrounding areas</p> <p>Indicators:</p> <ul style="list-style-type: none"> <li>• No jackals, hyaena or dogs occur at waste sites</li> <li>• No safety incidents are reported at sites</li> <li>• Waste blown from the site is contained by suitable infrastructure (fencing)</li> </ul>	<p>Municipality</p> <p>Municipality</p>	<p>Physical inspections</p> <p>Municipal waste management reports</p>

## 4.2 Water management

**Water for Oranjemund is extracted from the Orange River. As the town is not operated independently from the mine, the extraction is fed off the mine in-take. Water is not metered in Oranjemund, therefore citizens are unaware of the water usage, and according to sources quite ignorant of the consequences of water wastage.**

Impacts of poor water management are:

Human health & wellbeing

- Inadequate water supply will impact on hygiene and wellbeing of residents.
- Economic impact
  - Water shortages will limit town growth and economic development.
- Town image
  - Possible perceptions that coastal towns are insecure investment and holiday destinations.
- Biodiversity
  - Reducing the ecological flow of the river will impacts on the ecological functioning of the river mouth.

### ROOT CAUSE

- **The root cause of pressure on the freshwater reserve is inadequate demand management.**

### VISION

**Potable water is used efficiently to enable sustainable development in Oranjemund without negatively affecting the Orange River Mouth ecosystem.**

Desired outcome	Performance target and indicators	Party responsible for implementation	Data source
<b>Domestic water use is not excessive</b>	Target: Citizens and visitors use water sparingly.. Indicators: <ul style="list-style-type: none"> <li>● Per capita domestic water use is in line with international norms (40 m<sup>3</sup> / person/ anum)</li> <li>● All accommodation establishments provide awareness materials to their</li> </ul>	Municipality NamWater  HAN	NamWater  HAN, reports

	<p>guests;</p> <ul style="list-style-type: none"> <li>• The municipality reinforces water awareness by including a message relating to water saving on their monthly municipal accounts.</li> </ul>	Municipality	Municipal brochure
<b>Water is not lost through leakage from faulty pipes and pumps</b>	<p>Target: Water infrastructure is in good condition and deficiencies are timeously identified and remedied</p> <p>Indicator: (look for international norm for losses from leakage)</p> <ul style="list-style-type: none"> <li>• Unaccounted for water is less than (*(%;</li> </ul>	Municipality	Municipal water balance
<b>Water is efficiently recycled and reused by the municipality as well as business and industry</b>	<p>Target: Greywater is increasingly used for public and industrial purposes</p> <p>Indicators:</p> <ul style="list-style-type: none"> <li>• All sports facilities and public gardens use only recycled water;</li> <li>• Business and light industry maximise the use of recycled water.</li> </ul>	Municipality	Municipal reports
		NAMDEB and industry	NAMDEB meeting minutes
<b>Industries use fresh water efficiently</b>	<p>Target: Heavy industries optimise their water use relative to production and/or output</p> <p>Indicators:</p> <ul style="list-style-type: none"> <li>• All industries report annually on their freshwater consumption</li> </ul>	NAMDEB and industry	NAMDEB annual report



### ***4.3 Energy management***

**NamPower supplies electricity to the town for general consumption. As a result of the growth of industry (particularly from mining) in the area, energy provision is under pressure. Energy demand management by energy users is encouraged by NamPower through awareness campaigns, but no specific demand management actions are applied by the municipality.**

Impacts are likely to be:

- Human health & wellbeing
  - The need to provide localised electricity in the form of a coal-fired powerstation (as is in construction at Walvis Bay) can impact on air quality, which may affect human health.
- Economic impact
  - With increased demand the cost of electricity is expected to rise rapidly;
  - Load shedding as a result of over-use of electricity will affect productivity and economic growth;
  - Energy shortages will limit town growth and economic development.
- Town image
  - Possible perceptions that coastal towns are insecure investment and holiday destinations.
- Biodiversity
  - Climate change as a result of burning more fossil fuels result in impacts on biodiversity.

#### **ROOT CAUSE**

- **The root cause of pressure on the electrical production capacity of NamPower and Eskom is increased development in the region without adequately considering the sustainable energy needs;**
- **In addition to the above root cause, a second root cause is reluctance to realistically consider alternative energy sources.**

#### **VISION**

**Businesses and residents of Oranjemund use energy sparingly and use sustainable energy sources where possible.**

Desired outcome	Performance target and indicators	Party responsible for implementation	Data source
<b>Domestic energy use is not excessive</b>	Target: Citizens and visitors use electricity sparingly. Indicators: <ul style="list-style-type: none"> <li>• Per capita domestic energy use is reduced</li> <li>• All accommodation establishments provide awareness materials to their guests;</li> <li>• The municipality reinforces energy efficiency awareness by including a message relating to energy saving on their monthly municipal accounts.</li> </ul>	Municipality NamPower  HAN  Municipality	NamPower  HAN reports  Municipal brochure
<b>Sustainable energy sources are considered for use at local level</b>	Target: Sustainable energy (wind / solar / tidal) is used at local level Indicator: <ul style="list-style-type: none"> <li>• Pilot projects on the use of sustainable energy are initiated and funded;</li> <li>• NamPower are encouraged to seek alternative energy solutions.</li> </ul>	Municipality, NGOs, NamPower  Municipality, citizenry	Municipal meeting minutes  NamPower annual report

#### *4.4 Climate Change Adaptation*

**There is growing scientific evidence and emerging consensus that Climate Change is an inevitable reality and that coastal areas are increasingly vulnerable to Sea level rise, Beach Erosion and possibly localised flooding from more frequent and more intense storm events. Also, it is likely that there will be less precipitation and more evaporation that combine to place pressure on potable water supplies and ecological functioning.**

Impacts are likely to be the following:

- Human health & wellbeing
  - Pressure on water supply may impact on hygiene and wellbeing of residents;
  - Increased likelihood of flooding associated with storm events may endanger lives.
- Economic impact
  - Sea Level Rise may threaten the integrity of infrastructure along the seafront, resulting in damage and lower property prices;
  - More frequent and intense storm events may cause property damage, affect businesses and insurance premiums;
  - The above two impacts will place escalating pressure on local authorities and their budgets;
  - If salt water intrusions occur as a result of a combination of lowered aquifer water tables and Sea Level Rise, the aquifers will no longer be able to supply fresh water, thus requiring additional investment in desalination.
- Town image
  - Possible perceptions that coastal towns are insecure investment and holiday destinations.
- Biodiversity
  - Mining of aquifers may lead to lower water tables which will affect biodiversity in and along ephemeral rivers, as well as river mouths and estuaries
  - If salt water intrusions occur as a result of a combination of lowered aquifer water tables and Sea Level Rise, ephemeral river biodiversity will be adversely affected.

#### **ROOT CAUSE**

- **Global increase in fossil fuel burning caused by economic activities in the industrialised world. In this case Namibia does not contribute significantly to the problem but is significantly affected and particularly vulnerable to Climate Change;**
- **The main contributing factors to Namibia's vulnerability in the coastal town context is inadequate planning and awareness relating to Climate Change.**

## VISION

**Oranjemund is able to adapt to Climate Change by predicting and putting in place plans to deal with Climate Change impacts.**

Desired outcome	Performance indicator and target	Party responsible for implementation	Data source
<p><b>Sea Level Rise and Beach Erosion do not endanger human safety and town infrastructure</b></p>	<p>Target: Areas where sea level rise and associated beach erosion may occur are identified and no development is allowed in these areas.</p> <p>Indicators:</p> <ul style="list-style-type: none"> <li>• A high-scale contour map is produced of the shoreline;</li> <li>• Areas likely to be inundated by sea level rise and storm surges are out of bounds for development.</li> </ul>	<p>Municipality</p> <p>Municipality</p>	<p>Map</p> <p>Town development plan</p>
<p><b>Potable water is conservatively managed to make provision for the effects of climate change</b></p>	<p>Target: Potable water sources are utilized sustainably.</p> <p>Indicators:</p> <ul style="list-style-type: none"> <li>• A water-balance model is established for key supply aquifers and it is monitored;</li> <li>• A strict step pricing system is established and implemented;</li> <li>• Greywater from sewage treatment is recycled and</li> </ul>	<p>Municipality supported by NamWater</p> <p>Municipality</p> <p>Municipality</p>	<p>Water balance</p> <p>Municipal water pricing</p> <p>Municipal management reports</p>

Desired outcome	Performance indicator and target	Party responsible for implementation	Data source
	<p>used in open spaces / gardens;</p> <ul style="list-style-type: none"> <li>• Demand management is strictly applied for business and domestic water use;</li> <li>• Water wastage and leakage is minimised.</li> </ul>	<p>Municipality supported by NAMDEB, industry and public</p> <p>Municipality and public</p>	<p>Meeting minutes</p> <p>Water balance</p>
<p><b>The town is adequately prepared for storm events</b></p>	<p>Target: Stormwater systems are able to cope with precipitation from storm events.</p> <p>Indicators:</p> <ul style="list-style-type: none"> <li>• Gutters, rainwater sumps and pipes are in place;</li> <li>• Roads are engineered to enable adequate runoff;</li> <li>• Below street level garages and basements have adequate protection and drainage.</li> </ul>	<p>Municipality</p> <p>Municipality</p> <p>Municipality supported by building industry</p>	<p>Town infrastructure plan</p> <p>Town infrastructure plan</p> <p>Physical inspections</p>

#### *4.5 Biodiversity*

**Recreational use of off-road vehicles impacts on sensitive habitats (particularly within the Sperrgebiet) affecting protected species and their habitat.**

**Excessive and uncontrolled fishing may affect the sustainability of populations of line-fish species as well as lobster.**

**Poaching of wildlife species for food or commercial gain in areas surrounding Oranjemund may reduce populations of wildlife in the area. Litter from the town landfill, activities within the town as well as surrounding areas could impact on the health of animals.**

Human health & wellbeing

- Insignificant impact.
- Economic impact
  - Eco-tourism concentrating on the desert surrounding Oranjemund may lose part of their product.
- Town image
  - The presence of biodiversity and healthy ecosystems around the town adds to its sense of place.
- Biodiversity
  - Off-road driving by quad bikes and 4x4 vehicles destroy sensitive habitats and their associated species (possibly a number of keystone species);
  - Overfishing of recreational fish and crustacean species by local residents and visitors to Oranjemund affects populations of these species as well as other species along the food chain;
  - Littering pollutes habitats surrounding Oranjemund affecting species occurring within them;
  - The health of animals (including birds) scavenging on the landfill sites may be compromised.

#### **ROOT CAUSES**

- **The root cause of impacts caused by off road driving is ignorance of these impacts from lack of knowledge about the sensitivity and value of biodiversity in the area;**
- **The root cause of overfishing and poaching is greed, but also ignorance about the vulnerability of natural resources to exploitation on the part of anglers and lack of regulation and law enforcement from authorities;**
- **The root cause of litter is ignorance as well as poor waste management causing plastic to blow into the desert.**

## VISION

The residents of and visitors to Oranjemund are able to enjoy the marine and terrestrial environment surrounding the town without impacting significantly on ecosystem services and biodiversity.

Desired outcome	Performance indicator and target	Party responsible for implementation	Data source
<p><b>The town becomes a conservation partner of the desert, coastal and marine environments.</b></p>	<p>Target: Authorities, business community and residents support conservation efforts</p> <p>Indicators:</p> <ul style="list-style-type: none"> <li>• The town supports conservation programmes and institutions;</li> </ul>	Municipality	Municipal reports
	<ul style="list-style-type: none"> <li>• The town proactively provides information to the public about the need to conserve the environment;</li> </ul>	Municipality	Information brochures
	<ul style="list-style-type: none"> <li>• The local authority supports conservation (MET) and fisheries (MFMR) law enforcement agencies;</li> </ul>	Municipality	MET and MFMR reports on apprehensions
	<ul style="list-style-type: none"> <li>• The local authority assists schools with quarterly conservation awareness activities.</li> </ul>	Municipality, supported by schools	Municipal reports

Desired outcome	Performance indicator and target	Party responsible for implementation	Data source
<p><b>The town and surroundings are generally litter free</b></p>	<p>Targets:            1) Improved landfill management</p> <p>Indicators:            (Refer to waste management EQO)            2) Improved management of public recreation areas</p> <p>Indicators:</p> <ul style="list-style-type: none"> <li>• Refuse bins at parks, parking areas, beaches are conveniently available and do not overflow;</li> <li>• Littering is vigorously punished by LA law enforcement officers.</li> </ul>	<p>Municipality</p> <p>Municipality, local law enforcement</p>	<p>Physical inspection</p> <p>Municipal reports</p>
<p><b>Tourism and recreational activities in the ocean and on land do not impact negatively on biodiversity</b></p>	<p>Target:            Citizens ,tourists and tour operators behave responsibly towards the environment</p> <p>Indicators:</p> <ul style="list-style-type: none"> <li>• Tour operators subscribe to an environmental code of conduct;</li> <li>• The local authority supports and cooperates with MET and MFMR to ensure that law breakers are apprehended</li> </ul>	<p>TASA, HAN</p> <p>MET, MFMR, Municipality</p>	<p>Code of Practice Developed</p> <p>Off-road driver, illegal fishing apprehensions</p>

Desired outcome	Performance indicator and target	Party responsible for implementation	Data source
	<p>and punished;</p> <ul style="list-style-type: none"> <li>• Tourists regard the town and surroundings as clean and well conserved.</li> </ul>	Municipality	Survey

#### 4.6 Sense of place

**Residents and tourists of the Namibian coast are attracted by the unique sense of place which is defined as tranquil, surrounded by aesthetically pleasing urban and natural landscape where adventure activities, angling and eco-tourism are possible activities. Impacts such as increased traffic, pollution, uncontrolled mining, rapid urban development (especially if poorly planned) and industry have the potential to affect this sense of place negatively.**

Impacts are likely to be:

- Human health & wellbeing
  - Eroded sense of place can affect human attitude and wellbeing.
- Economic impact
  - Property value will fall with reduced sense of place;
  - Reduced sense of place will result in lower visitor numbers, affecting the tourism and recreation industry in the area, and thus the economy.
- Town image
  - Visual impacts and noise will lead to compromised natural beauty and a deteriorated sense of place.
- Biodiversity
  - Degradation of natural landscapes has the potential to affect ecosystem processes and services, including migration routes, seed dispersal, nutrient and moisture cycling and endemic species fragmentation.

#### ROT CAUSE

- **The root cause of deteriorating sense of place is population influx and urban growth related to an increased industrialisation in the central Namib as a result of mining opportunities.**

#### VISION

**Oranjemund develops economically, contributing to Namibia's need to offer jobs and generate revenue without losing and in fact enhancing its unique sense of place.**

Desired outcome	Performance indicator and target	Party responsible for implementation	Data source
<b>Industrial development is planned to ensure minimal disturbance to sense of place</b>	Target: Zoning plans for industry considers the effects on sense of place: Indicators: <ul style="list-style-type: none"> <li>• An expert</li> </ul>	Municipality supported by industry	Municipal management



## 5. Implementation of the Environmental Management Plans

Implementation of the EMP recommendations is the direct responsibility of the Oranjemund Municipality, although many public, government and corporate stakeholders have been assigned supporting activities. It is recommended that a responsible person is identified or recruited to undertake overall coordination of the plan. The person may be the current environmental health officer, or may be seconded by a conservation institution or NGO. It is however important to understand that implementation of the EMP requires a “team effort” from all interested and affected parties in the town. It is proposed that various aspects of the EMP are separately managed by municipal departments, government authorities, NGOs, civil society and individuals. The EMP coordinator will merely be responsible for ensuring correct implementation and monitoring. It is acknowledged that implementation of some measures would require substantial time and / or financial resources, while others are achievable within operational norms. The municipality can thus decide on the prioritization of mitigation measures according to their resource capacity within the institution.

Table 1 below recommends where responsibility for implementation of EMP mitigation measures lies:

Table 1: EMP EQO management and responsible parties

<b>Environmental issue</b>	<b>Aspect or activity</b>	<b>Responsible institution</b>	<b>Supported by</b>
<b>Biodiversity conservation</b>			
	Off road driving	MET	Municipality
	Fishing and poaching	MFMR	
	Litter	Municipality	MET & MFMR
	Risks to wildlife (e.g. scavengers at landfills)	Municipality	MRLGHRD
<b>Shoreline integrity</b>			
	Building lines	Municipality	Namdeb
	Piers and berms	Municipality	Namdeb
<b>Traffic management</b>			
	Quad bikes	Municipality	MET
	Road planning	Municipality	MLRGHRD
	Speed control	Municipality	
	Roadworthiness	Municipality	
<b>Waste management</b>			
	Landfill	Municipality	Namdeb
	Refuse removal	Municipality	Namdeb
	Incineration	Municipality	
	Sanitation	Municipality	

	Marine pollution	MFMR	Municipality
<b>Water management</b>			
	Demand management	Residents Namdeb	Municipality NamWater
	Infrastructure management	Municipality	
	Water recycling	Municipality	NamWater
	Storm-water management	Municipality	
<b>Energy management</b>			
	Demand management	Residents	Municipality NamPower
	Renewable energy generation	Residents Municipality	NamPower NGOs
<b>Open spaces (public recreation)</b>			
	Parks	Municipality	Residents
	Green zones	Municipality	NGOs
	Cycling infrastructure	Municipality	Namdeb
	Pedestrian / walking areas	Municipality	Residents
<b>Sense of place</b>			
	Roadside advertising	Municipality	Businesses Residents
	Orderly town planning	Municipality	MRLGHRD Karas RC
	Architecture	Municipality	Namdeb Residents

## **6. Recommendations and conclusions**

Various impacts of activities within the town on the environment were identified. These are categorized within the following environmental aspects:

- Waste management;
- Water management;
- Energy management;
- Shoreline integrity;
- Climate change adaptation;
- Sand and gravel mining;
- Traffic management;
- Biodiversity conservation; and
- Sense of place.

An Environmental Quality Objective (EQO) was formulated for each of these aspects. Each EQO contains a vision which describes an ideal state for management of that particular aspect of the environment in or around the town. It further specifies the root causes of impacts relating to the environmental aspect. A set of targets and indicators are proposed for mitigating specific impacts, with suggestions for which institution / individual is responsible for its implementation.

### ***Monitoring***

For each social and environmental issue described in Chapter 7, targets and indicators are presented. Annual monitoring of performance in relation to the targets should be undertaken. An annual environmental scorecard can then be produced, illustrating performance of the town relating to various environmental aspects.

### ***Awareness raising***

Raising awareness about impacts of various activities on the environment is captured as a mitigation measure in various sections of this EMP. The various awareness raising needs can be combined into a “Greening our Town” campaign, and disseminated through posters, brochures, radio interviews and a series of public lectures.

### ***Implementation of the EMP***

It is acknowledged that implementation of some measures would require substantial time and / or financial resources, while others are achievable within operational norms. The municipality can thus decide on the prioritization of mitigation measures according to their resource capacity within the institution.

## **7. References**

(to be added)



**Annexure 1: Public participation attendance list and notes**

(to be added when the process is completed)

## **Annexure 2: The impact of climate change on coastal towns in Namibia**

### *Climate Change Impacts*

#### **a) Introduction**

Since the onset of the industrial revolution, human-induced greenhouse gases (carbon dioxide and others) have accumulated in the atmosphere. In addition, deforestation is steadily removing one of the planet's major natural carbon dioxide sinks. Consequently, the raised concentration of greenhouse gases (GHGs) has begun to cause a discernible increase in the Earth's average surface temperature. These raised temperatures, in turn, have the ability to cause sea-level rise (SLR) and large scale, long-term changes to global climate.

When compared to heavily populated megadeltas/estuaries, coral reefs/atolls, and ice-dominated coastlines, Namibia's coastal towns cannot be considered 'hotspots' for the impacts of SLR, nevertheless local authorities need to pay cognisance to the fact that low-lying coastal areas, sand and gravel beaches are likely to experience significant impacts as a result of climate change - impacts that will be exacerbated by the nation's (already) limited water resources and expanding human population.

#### **b) Climate change: Current trends and projections**

Current trends show that :-

- Global temperatures have risen since the 1850's and rates of change are becoming more rapid. For example, eleven of the twelve years in the period 1995–2006 rank among the top 12 warmest years since 1850 (IPCC, 2007).
- Observations since 1961 show that the oceans have been absorbing more than 80% of the heat added to the climate system, and that ocean temperatures have increased to depths of at least 3000 m . Warming causes seawater to expand, which contributes to sea level rise (*ibid*)
- Sea level rose by an average rate of 1.8 mm/year during the years 1961-2003 ( IPCC, 2007). Research conducted in southern Africa from 1959 – 1990 show trends in SLR that are comparable to global trends ( Hughes *et al* 1991; Hughes *et al*, 1992)
- Rates of SLR appear to be increasing. The IPCC's predictions for SLR (a best-estimate rise of less than 2 mm per year) were considerably lower than the actual rise (3.3 mm /yr) which occurred between 1993 and 2006 (Rahmstorf *et al*,2007).

When investigating future vulnerabilities and impacts of climate change, the IPCC considers six possible GHG emissions scenarios which span a range of projected temperature and sea level rises from a best estimate average temperature rise of 1.8 °C (accompanied by a sea level rise of 18 to 38 cm), to a best estimate average temperature rise of 4 °C (accompanied by a sea level rise of 26 to 59 cm) for the 2070 - 2080 decade<sup>12</sup>.

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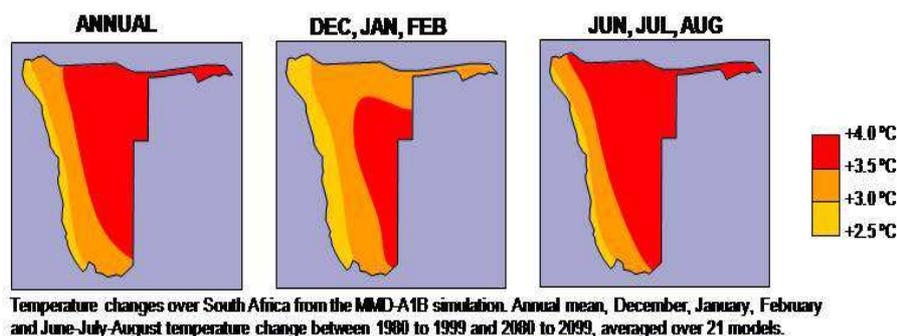
<sup>12</sup> The most up to date research on climate change in Namibia (as presented in Turpie *et al* 2010) is based on the A1B emissions scenario. This research draws on the outcomes taken from several General Circulation Models (GCMs) that were

Current scenarios for Namibia (2050 – 2080) as described by these and other authors are summarised as follows:-

- Temperature rise in Namibia will be higher inland than at the coast (an increase of between 2 - 6°C depending on the locality) as presented in Figure 9.X below.

Figure 9.X. Predicted changes in temperature for Namibia ( AR4; A1 B Scenario)

Source: Turpie *et al* 2010



- Under the A1B emissions scenario SLR will fall within the range of 21 to 48 cm by 2050. The timescales of ocean warming are much longer than those of surface air temperature rise. As a result, SLR is expected to continue at a significant rate for centuries, even if climate forcing is stabilized.
- Nicholls *et al* ( 2007) report that local sea-level change could depart significantly from global mean trends due to variations in oceanic level change and local geological uplift/subsidence. Coasts subsiding due to natural or human-induced causes will experience larger relative rises in sea level.
- Storm intensity is likely to increase at coastal localities throughout the world, with more extreme high-tide events.
- Models suggest that both tropical and extra-tropical storm intensity will increase around the world. This implies additional coastal impacts than attributable to SLR alone, especially for tropical and mid-latitude coastal systems. While this has no bearing on

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updated for the IPCC's Fourth Assessment Report (AR4). Because levels of uncertainty in projections (and particularly variability in current precipitation regimes) are so high, these authors, instead of looking at just one or two models, took the average of 21 GCMs, which presented a range of high, median and low climate predictions.

Namibia's coast under current conditions, there is a slight possibility that shifts in wind regimes and other changes (which could result in an altered current regimen off the Namibian coast) may occur (in Tarr 1999). This, in turn, could affect Namibia's vulnerability to tropical storms and cyclones.

- There is expected to be an increase in climatic variability future decades. Thus, despite an overall increasing aridification, periodic heavy precipitation events are likely to become more common. This will increase flood risk on ephemeral and perennial rivers.
- It is predicted with a moderate degree of certainty that Namibia will experience a 10% decrease in rainfall in the northern and southern regions, and a 20% decrease in the central regions by 2050. This situation will worsen with possible rainfall reductions of 20% and 30% respectively by 2080 (Turpie *et al* , 2010)
- The cumulative impacts of higher temperature, lower rainfall and higher evaporation rates will be accompanied by (*inter alia*) reductions in runoff, streamflow and aquifer recharge.

### c) Climate drivers and their main biogeophysical impacts

Namibia's entire 1600 km long coastal zone falls within the Namib Desert. Approximately 78% of the shoreline is comprised of sandy beaches, 4% of mixed shores of sand and rock and 16% of rocky shores. The surf zone is described as moderately high energy (Campbell 1993).

The land that flanks the coastline comprises mobile sand dunes, extensive gravel plains and occasional exposed bed rock surfaces. Strong prevailing south-westerly winds transport sediment towards the shoreline and sand-drift towards the north-east.

A range of coastal responses can be expected for Namibia as a result of sea-level rise (Table 9.X). These include biogeophysical effects such as:- increasing rates of coastal erosion; increased flooding, inundation and displacement of wetlands and lowlands; impairment of water quality into freshwater aquifers and estuaries due to increased salt intrusion; and reduced protection from extreme storm and flood events.

The rate, magnitude and direction of sea-level change will vary considerably due to local alterations in ocean conditions and vertical movements of the land. In addition, the actual response of coastal zones and systems to these changes will differ substantially according to local geomorphic conditions and sediment supply.

Table X. Selected climate drivers for coastal systems and their main effects. (Trend: ↑ increase; ? uncertain; R regional variability). [Source: **Adapted from** Nicholls *et al* ,2007]

Relevant climate driver	Main effects on coastal systems
Sea level (↑, R)	Inundation, flood and storm damage; Coastal erosion; saltwater intrusion; rising water tables/impeded drainage; wetland loss (and change).

<b>Storm intensity</b> (↑, R)	Increased extreme water levels and wave heights; increased episodic erosion, storm damage, risk of flooding and defence failure.
<b>Storm frequency</b> (?, R)	Altered surges and storm waves and hence risk of storm damage and flooding.
<b>Wave climate</b> (?, R)	Altered wave conditions, including swell; altered patterns of erosion and accretion; re-orientation of beaches .
<b>Run-off</b> (R)	Altered flood risk in coastal lowlands; altered water quality/salinity; altered fluvial sediment supply; Altered circulation and nutrient supply.

Nicholls *et al* 2007 report the following geophysical impacts as a result of SLR :-

- SLR intensifies natural rates of beach erosion dramatically. The Bruun model of 1962 suggests that shoreline recession occurs in the range 50 to 200 times the rise in relative sea level (dependent on the locality and total sediment budget).
- As sea-level rises, estuaries and lagoons attempt to maintain equilibrium by raising their bed elevation - acting as a major sink for sand derived from the open coast. This process can cause erosion of an order of magnitude greater than that predicted by the Bruun model. This suggests that there is potential for considerable coastal instability due to SLR in the vicinity of tidal inlets.
- Beach protection strategies and changes in the behavior or frequency of storms can be more important than the projected acceleration of SLR in determining future beach erosion rates.
- The combined effects of beach erosion and storms can lead to the erosion or inundation of other coastal systems. For example, an increase in wave heights in coastal bays can cause a secondary effect of sandy barrier island erosion, and increased wave heights have enhanced erosion rates of bay shorelines, tidal rivulets and adjacent wetlands.
- Although inundation by increases in mean sea level over the 21st century and beyond will be a problem for unprotected low-lying areas, the most devastating impacts are likely to be associated with changes in extreme sea levels resulting from the passage of periodic storms.
- The impacts of accelerated sea-level rise on gravel and cobble-boulder beaches has not been well-researched but literature reviewed in Nicholls *et al* 2007 suggests that these highly dynamic shorelines will be strongly influenced by rising seas , more intense spring high tides and storms.
- Hard rock cliffs have a relatively high resistance to erosion but four physical features of climate change – temperature, precipitation, sea level and wave climate – can affect the stability of soft rock. Thus, rocks and cliffs formed in softer lithologies are likely to erode much more rapidly as a result of climate change.

#### d) Socio-economic consequences of climate change on coastal settlements

Namibia's coastal settlements are economically dependent largely on mining, tourism and /or fisheries, although smaller industries (salt, guano and mariculture) also play a role in local economies. These economic drivers will all be affected to one degree or another by the impacts of climate change ( Table 9.X). Of these , the most pertinent to the LA's of coastal towns will be the impact on freshwater supply and infrastructure.

**Table 9.X Summary of climate-related impacts on socio-economic sectors in coastal zone (adapted from Nicholls *et al*, 2007).**

Coastal sector ( 1 ) = of primary concern for LA; (2) = of secondary or no concern for LA	Climate-related impacts (and their climate drivers )						
	Temperature rise	Extreme events (storms, waves)	Floods and inundation (SLR;	Rising water tables (SLR)	Erosion (SLR storms, waves, sediment changes)	Salt water intrusion (SLR; runoff)	Biological effects (all climate drivers)
Freshwater availability (1)	X	-	-	-	-	X	-
Fisheries and aquaculture (2)	X	X	x	-	x	X	X
Health (1)	X	X	X	x	-	X	X
Recreation and tourism (2)	X	X	x	-	X	-	X
Biodiversity (2)	X	X	X	X	X	X	X
Offshore diamond mining (2)	-	X	-	-	X	-	-
Settlements/ infrastructure (1)	x	X	X	X	X	X	-

X = strong; x= weak; - = negligible or not established.

- Of major concern for all coastal settlements in Namibia will be the provision of water. Because of high evaporation rates, it is estimated that only 2% of the rain that falls in Namibia is available as runoff and only 1% is available to recharge groundwater (Heyns *et al*. 1998). Furthermore, Namibia's sparse rainfall displays a high degree of temporal and spatial variability. This leads to a corresponding high variability in runoff and stream flow. Thus, even in the absence of climate change, water demand in Namibia (dictated by the expansion of irrigation and mining projects as well as the

- domestic demands of a rapidly expanding, urbanising population), is expected to surpass the installed abstraction capacity by 2015 (in Dirkx *et al.* 2008).
- Due to ambiguities in measuring changes to rainfall and runoff it is difficult to deduce the CC implications for groundwater recharge in Namibia. Some of the literature quoted by Dirkx *et al.* (2008) suggests that groundwater recharge may suffer a reduction of 30-70% across Namibia by 2050 which, in turn, will result in reduced aquifer recharge and lowering of the water table across most of the country.
  - The scale of salt-water intrusion of coastal aquifers will depend on the size of the aquifer, geological factors, groundwater withdrawals, surface water recharge, submarine groundwater discharges and precipitation. Salinisation of surface waters in estuaries will also be promoted by SLR (e.g at the Orange River mouth).

#### e) Case Study :- Vulnerability of Walvis Bay to the effects of sea-level rise

A preliminary study conducted for Walvis Bay almost 20 years ago (Hughes, *et al* 1992), can be used to illustrate the potential impacts of climate change on Namibia's coastal settlements. This study investigated possible impacts due to *increased erosion, flooding, elevated water tables and salt pollution and extreme storm events* for sea-levels elevated 20cm, 50cm and 100cm above 1991 levels.<sup>13</sup>

Walvis Bay, located in a semi-sheltered bay (approximately 970 km<sup>2</sup>), is considered to be particularly vulnerable to the impacts of climate change – not only because it is low lying (average relief of between 1m and 3m above mean sea-level ) and susceptible to SLR, but also because of the possibility of the increasing occurrence and intensity of flooding by the Kuiseb River. The adjacent coastline is soft, sandy and erodible. The town relies on coastal aquifers, fed from sources underlying the Kuiseb and Omaruru Rivers, for water. Rainfall is usually in the region of < 20 mm per annum and to date storm water drainage has been unnecessary.

The main conclusions of the study conducted by Hughes *et al* 1991 are summarised as follows :-

**Erosion.** An application of the Bruun rule to 11 sites along the coastline within the environs of Walvis Bay indicated that that the effect of increased coastal erosion is likely to have limited impact on the town as it was in 1991. This is because development had, as yet, not occurred along the most dynamic and vulnerable parts of the coastline. Development in the most vulnerable built up area (adjacent to the lagoon) is no longer permitted.

**Salt water intrusion.** Unsustainable abstraction of water from the Kuiseb aquifer is likely to result in salt water intrusion. Rising sea-levels will exacerbate this effect but the proposed development of a desalination plants and consequent reduced abstraction from the aquifer should mitigate these effects.

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<sup>13</sup> Based on a rough estimate for global sea-level rise since 1991 - 2006, sea levels have risen off the Namibian coast by approximately 5 - 6 cm. At an average rate of SLR of 3.3 mm/year, a 20 cm rise can be expected by 2050.

**Storminess.** Under even the lowest sea-level rise scenario used in this study, parts of Walvis Bay are expected to become extremely vulnerable to the effects of higher, storm induced coastal water levels. A future 1 in 10 year storm, after a 20 cm rise in sea-level, would attain a higher water level than that which could be reached by a 1 in 1000 year event in 1991.

**Flooding and Inundation.** Any rise in the water table from its 1991 position at about the MHWS level ( 0.71 m elevation) will have serious consequences for the town. Undoubtedly the tidal volume of the lagoon will increase but this is likely to be offset by the natural sedimentation of this wetland. A lack of accurate knowledge regarding rates of sedimentation in the lagoon precludes a realistic delineation of those areas that are at risk except to say that, under the three scenarios (a rise of 20 cm , 50 cm and 100 cm), unprotected land below 0.9m, 1.2m and 1.7m elevation respectively, is vulnerable to inundation.

Changes in saline groundwater levels under the town are likely to match changes in sea-level. Thus, those low lying areas vulnerable to inundation will be vulnerable to waterlogging even if shore protection work is carried out. For example:

- A 20 cm sea-level rise will cause areas lying below 0.9m, (e.g. the hospital and primary and secondary schools) to flood at high tide.
- A 50 cm rise will flood a greater area of the town and harbour. This will affect production in the salt works and is likely to cause engineering and pollution problems in areas like the cemetery and sewerage works which all lie at approximately 1m above mean sea-level.
- A 100 cm rise is likely to flood the majority of the town below 1.7m elevation during high tide.

#### **f ) Recommendations for coastal town planners and LA's.**

The long timescales of sea-level rise suggest that coastal management, including spatial planning, needs to take a long-term view on adaptation to sea-level rise and climate change, especially regarding long-life infrastructure.

Differences in geological and oceanographic processes will lead to substantially different impacts on coastal systems at different localities. As there is not a simple relationship between SLR, increased occurrence of high storm events and coastal erosion, a specialist SLR Risk Assessment (such as that conducted for Walvis Bay) should be conducted for each of Namibia's coastal towns. A Risk Assessment of this nature will combine local land survey and geomorphological information with a range of up to date SLR scenarios, and is strongly advised as a foundation for all future town planning. Coastal erosion can be extremely costly and accounting for the full range of costs can be difficult. The IPCC (2007) suggest that studies, in addition to identifying vulnerable areas, should also consider :-

- (i) Appropriate types of shoreline protection (e.g., beach nourishment, hard protection or other responses) in situations where rates of shoreline retreat are likely to increase;
- (ii) The long-term cost and sustainability of such interventions; and
- (iii) Whether insurance (or other factors) provided by the public and private sectors encourage people to build, and rebuild, in vulnerable areas

The IPCC reports that one constraint to successful management of climate-related risks to

coastal systems is the limited ability to characterise in appropriate detail how coastal systems, and their constituent parts will respond to climate change drivers and to adaptation initiatives (Nicholls *et al*, 2007). This lack of understanding of coastal systems, including their highly interactive nature and non-linear behaviour, means that failure to take an integrated approach to defining climate-related risks increases the likelihood that the effectiveness of adaptation will be reduced, and perhaps even negated.

Since it offers advantages over purely sectoral approaches, integrated coastal zone management (ICZM) is widely recognised and promoted as the most appropriate process to deal with climate change, sea-level rise and other current and long-term coastal challenges.

## **Annexure 3: Legal and institutional detailed report**

### **Policy and Legal Framework applicable to the Environmental Management Plans for the coastal Towns of Luderitz, Swakopmund, Oranjemund and Henties Bay**

#### **Background**

This section of the report deals with the relevant policy and legislative framework that may be considered when Environmental Management Plans are developed for Luderitz, Swakopmund and Henties Bay.

#### **Overview of Environmental Legislation and Policies**

*Namibia's Environmental (Impact) Assessment Policy for Sustainable Development and Environment Conservation* was approved by Cabinet in 1995. This policy requires that all policies, programmes and projects, as listed in the policy, whether they are initiated by the government or private sector, should be subject to an Environmental Impact Assessment (EIA). The Government of Namibia recognises that EIAs are key tools to further the implementation of a sound environmental policy which strives to achieve Integrated Environmental Management (IEM). The Government also recognises that EIAs seek to ensure that the environmental consequences of development projects and policies are considered, understood and incorporated into the planning process. The purpose of the Policy is seen as informing decision makers and promoting accountability, ensuring that alternatives and environmental costs and benefits are considered, promoting the user pays principle, and promoting sustainable development.

The list of policies, programmes and projects requiring an Environmental Impact Assessment<sup>14</sup> include:

- structure plans;
- rezoning applications;
- any government policy, programme or project on the use of natural resources
- the declaration of limited development areas;
- land acquisition for national parks, nature reserves, marine reserves, protected natural environments of wilderness areas;
- mining and mineral exploration;
- ports and harbours;
- reclamation of land from the sea;
- salt works;
- mariculture;
- tourism and recreation facilities; and
- effluent and desalination plants.

#### **Environmental Management Act 7 of 2007**

This act was gazetted on the 31<sup>st</sup> of December 2007. It has not yet come into force.

The purpose of this Act is to promote the sustainable management of the environment and the use of natural resources by establishing principles for decision-making on matters affecting the environment; to establish the Sustainable Development Advisory Council; to provide for

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<sup>14</sup> Appendix B.

the appointment of the Environmental Commission and environmental officers; to provide for a process of assessment and control of projects which may have significant effects on the environment; and to provide for incidental matters. The Act gives legislative effect to the Environmental Impact Assessment Policy (mentioned above).

### **Draft Integrated Pollution Control and Waste Management Bill**

The purpose of this Bill is to regulate and prevent discharge of pollutants to the air, water and land in Namibia, and to enable the country to fulfil its international obligations in this regard. The draft Bill forbids any person from discharging or disposing any water or water course without a water pollution licence (aside from the discharge of domestic waste from a private dwelling or the discharge of pollutants or waste to a sewer or sewage treatment works).

The Bill provides for the issuing of water pollution licences. Such licence must specify: the amount of pollutants that may be discharged over a specific period, the locations of pipes or structures from which discharges may take place, any treatment or pre-treatment to which pollutants must be subject to prior to discharge, the design, construction, operation and maintenance of any structures required to achieve this, requirements for monitoring and reporting of the amount and rate of discharges, and provision for seasonal and other variations that may occur in the amount of pollutants which may be discharged.

The Bill requires that the application for a water pollution license must be accompanied by details of the activity to which the application relates, including the nature and location of the activity and its actual and potential effects on the environment. Members of the public must be given the opportunity to comment on all license applications.

A registry of all licenses issued will be maintained. Water protection works may be carried out to prevent or reduce the discharge of pollutants or waste into a water body or watercourse, to remove or dispose of the pollutant or waste, and to remedy, mitigate and restore waters or water courses, including dependent flora and fauna, to conditions existing prior to the pollution having entered the system.

The costs of such works can be recovered from the person or persons who caused the pollution to enter the system, unless they have been issued a licence in this regard. The Inspectors may be appointed for the purposes of this Bill, who have wide ranging powers in respect of monitoring compliance with the Bill, including the power to enter and search any premises or vehicle without a warrant or court order and collect evidence as required.

### **Water Act, 54 of 1956**

The Water Resources Management Act (WRMA) was assented to on 8 December 2004 but as at the date of this report, the date of commencement has not yet been proclaimed. When it commences the WRMA will repeal that Water Act 54 of 1956 (as amended). The Water Act was “selectively applied to what was then South West Africa,” and, though it has been repeatedly amended, it has remained the governing law of Namibia to the present day.<sup>15</sup>

Of relevance to this report is the following;

the Act makes it a criminal offence to:

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“Pollute fresh water or the sea in a way that makes the water less fit for any purpose for which it is or could be used by people, including use for the propagation of fish or other aquatic life, or use for recreational or other legitimate purpose.”<sup>16</sup>

This Act requires that water used for industrial purposes be purified before it is returned to a public stream or the sea, so as to conform with requirements established by the Minister of Agriculture, Water and Rural Development, but can be exempted from doing so, subject to certain conditions. The Minister in this instance may issue a permit to allow the discharge of waste water, effluent or waste in an un-purified or semi-purified state into a public stream, subject to such conditions that it does not cause pollution of “public or other water, including sea water” or provided that the discharge point is sufficiently close to the sea that no person will be prejudicially, and no aquatic or marine life detrimentally, affected by such discharge.

### **Overview of Development Planning Legislation**

There is no legislation in Namibia that requires the preparation of a coherent, national and regional land use framework but it is envisaged that this will be introduced when the Draft Urban and Regional Planning Bill is enacted. Currently the establishment of towns and the subdivision of land are regulated by the Townships and Division of Land Ordinance of 1963 while the development and application of town planning schemes is regulated by the Town Planning Ordinance 18 of 1954. Both these Ordinances must be read with the Local Authorities Act 23 of 1992.

### **Institutional Arrangements**

The National Planning Commission is responsible for coordinating and direction national development planning<sup>17</sup> while individual ministries are responsible for their own sector planning. The Ministry of Regional and Local Government and Housing and Rural Development (“MRLGHRD”) is responsible for spatial land use planning at a regional level. The Ministry of Lands and Resettlement (MLR) is in charge of land use planning for communal land in rural areas. State owned land is controlled by the Ministry of Works, Transport and Communications but the Ministry does not routinely undertake land use planning.<sup>18</sup> The Ministry of Environment and Tourism has on occasions undertaken land use planning in respect of areas designated for nature conservation such as the Skeleton Coast Park.

### **Local Authorities Act 23 of 1992**

This Act provides for the determination of local authorities and the establishment of local authority councils. It also sets forth the powers, duties and functions of such councils. Local authorities are given wide-ranging powers such as, “to supply water to residents; to provide and maintain sewerage and drainage systems; to provide waste removal services; to supply electricity or gas to residents; to establish and operate sand, clay, stone or gravel quarries; and to promote tourism.”<sup>19</sup>

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<sup>16</sup> Section 22.

<sup>17</sup> Namibia published its first National Development Plan in 1996.

<sup>18</sup> Coastal Profile of the Erongo Region – August 1999, page 134.

<sup>19</sup> Section 13.

If a local authority council discharges water from any waterworks or water main, or any storm water, into a public water course, it must at all times keep the natural channel of banks (up to the 50 year flood-line) clean and free from any artificial or natural obstructions which are likely to interfere with the flow of the watercourse or create a danger from flood waters (other than buildings lawfully erected before the commencement of the Act).<sup>20</sup> The local authority council may also require private landowners to do likewise and if they fail to do so, it may take the necessary measures and recover the cost from the person concerned.

A major environmental protection shortcoming is that the Act does not impose any specific obligation on local authorities to address environmental conservation in the coastal and marine areas to promote sustainable development. However, it does grant municipalities certain powers that can be used for these purposes. For example, a local authority may, after consultation with the Minister, make regulations by notice in the Gazette, in respect of “the supply, distribution and use of water in its local authority area including the protect from pollution of water;”<sup>21</sup> and “the restriction, regulation and control of the use of common pasture and townland, including a prohibition on the removal of soil, sand, vegetation, etc from such land.”<sup>22</sup>

Oranjemund is established on leasehold property with almost the entire infrastructure belonging to NAMDEB. It is not yet proclaimed as a town, and the Local Authorities Act therefore does not apply to it. NAMDEB, has however, developed an Environmental Management Programme Report in May 1996 which guides the mining company’s environmental management objectives in and around Oranjemund.

### **The Town Planning Ordinance 18 of 1954**

The Town Planning Ordinance makes provision for the preparation and carrying out of town planning schemes. The Ordinance aims to ensure that every town planning scheme shall have for its purpose the coordinated and harmonious development of the area to which it relates “in such a way as will most effectively tend to promote health, safety, order, amenity, convenience and general welfare, as well as efficiency and economy in the process of development and the improvement of communications.”<sup>23</sup>

The Ordinance applies to every local authority listed in the third schedule to the Ordinance<sup>24</sup> but the Minister is empowered to apply the provisions of the Ordinance to any other local authority.<sup>25</sup>

Section 4 requires every local authority to which the Ordinance applies to prepare and submit a town planning scheme to the Minister in respect of all land situated within the local authority area or with the consent of the Minister, specified land outside the boundaries of such local authority area. In preparing a scheme, the local authority must conduct a survey of the matters set out in the First Schedule to the Ordinance<sup>26</sup> and deal in detail with the matters

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<sup>20</sup> Section 19.

<sup>21</sup> Section 94(1)(a)(viii).

<sup>22</sup> Section 94(1)(z)(ad).

<sup>23</sup> Section 1(1).

<sup>24</sup> Section 3(1).

<sup>25</sup> Section 4(1).

<sup>26</sup> These include: physical characteristics (such as topography and contours, geology, rainfall, temperature, and winds); land utilization, with maps illustrating the usages of the area, (e.g. residential, commerce, industry, public buildings, open spaces, parks, and recreation grounds); and population densities and growth rates.

set out in the Second Schedule in the scheme.<sup>27</sup> The matters listed in the Second Schedule include:

1. A contour or topographical map of the area;
6. Sewerage, drainage, and sewage disposal.
7. The prohibition, regulation or control of the deposit or disposal of waste materials and refuse.
9. The reservation of land for Administration and local authority purposes of a public nature.
10. The demarcating or zoning of areas to be used exclusively or mainly for residential, business, industrial, and other specified purposes.
15. The preservation of buildings or other objects or architectural, historic or artistic interest and places of natural interest of beauty.”

The Ordinance also provides for the continued existence as a body corporate of the Namibia Planning Advisory Board (NAMPAB).<sup>28</sup> The main function of NAMPAB is to advise the Minister of Local Government and Housing in relation to town planning matters, but the NAMPAB is given wide powers and its functions include:

- b) to formulate in general terms a town planning policy for Namibia ...
- f) to advise and assist authorities generally in connection with the preparation of town planning schemes; ... and
- G) to advise the Minister on the subdivision of land situated outside an approved township or outside the townlands of such a township where either the subdivision or the remainder thus created is smaller than 25 hectares.”

Town planning schemes must be approved by the Minister<sup>29</sup> but the authority responsible for administering an approved scheme (usually the local authority) is given extensive powers to carry out and enforce the scheme. These include powers to remove, pull down or alter buildings or structural works which were in existence when the scheme came into operations and which do not conform to the scheme and to reinstate land which was being used for a purpose which now contravenes the provisions of the scheme.<sup>30</sup>

In certain circumstances a person who suffers damage, incurs expenditure or whose property is injuriously affected by the coming into operation of a scheme is entitled to recover compensation from the responsible authority.<sup>31</sup> However the Ordinance provides that no compensation is payable in respect of certain types of restriction imposed by schemes, including provisions that: fix building lines; regulation the character, size, height, harmony, design or external appearance of a building; or that prohibit the use of land for a purpose likely to involve a danger to life or danger or injury to health or serious detriment of the

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<sup>27</sup> Section 15.

<sup>28</sup> Previously South West African Planning Advisory Board.

<sup>29</sup> Section 21.

<sup>30</sup> Section 28(2).

<sup>31</sup> Section 32.

neighbourhood.<sup>32</sup> Unfortunately, the Ordinance does not provide for the exclusion and limitation of compensation where town planning schemes impose restrictions in the interests of the protection of the environment or the promotion of sustainable development. Accordingly compensation may be payable if such restrictions are imposed in town planning schemes if they can also be justified on other grounds accounted for in the Ordinance. (For example, it may be possible to justify restrictions on how close buildings may be situated to the high water mark on the basis that the restriction is imposed in order to reduce the threat to humans and properties imposed by sea level rise and storms.)

The Minister is empowered to order a local authority to prepare a scheme and to bring it into operation and if the local authority fails to do so to the satisfaction of the Minister within the time specified in the order, the Minister may direct the NAMPAB to do so at the expense of the local authority.<sup>33</sup> The Minister may also order a municipality to enforce compliance with a scheme or to do anything which the scheme requires to be done and the Ordinance provides that such an order may be enforceable by a means of a *mandamus* (i.e. a court order).

Alternatively the Minister may authorise the NAMPAB to take the necessary measures. If the local authority is unwilling to amend its scheme in order to give effect to coastal management objectives (e.g. by establishing building setback lines and other restrictions designed to preserve the coastal landscape) these provisions could conceivably be used to require them to do so.

In addition to the Town Planning Schemes provided for by the Act, municipalities often prepare additional non-statutory development and structure plans. For example, Swakopmund has prepared a structure plan with a 15 to 20 year perspective which involves the urban design of the beachfront area. The plan was prepared with public participation and is due to be reviewed every five years.<sup>34</sup> Strategic plans to guide the future development of towns in response to socio-economic factors are also developed by some local authorities (e.g. Walvis Bay and Swakopmund) and used as a means of prioritising municipal investments and informing annual budgeting.<sup>35</sup>

### **Draft Urban and Regional Planning Bill and Regulations**

It is envisaged that the current system of land use planning and development controlled in Namibia will be comprehensively reformed by the enactment of the draft Urban and Regional Planning Bill and regulations made under it.<sup>36</sup> The Bill provides for the establishment of national, regional and urban structure plans, and the development of zoning schemes. It also deals with a variety of related land use control issues such as the subdivision and consolidation of land and the establishment and extension of urban areas. The long title of the Bill indicates that it is intended that this will be done in the manner that “will most effectively promote health, safety, order, amenity, convenience and environmental and economic sustainability in the process of development.”

Part I of the Bill provides for the establishment of an Urban and Regional Planning Board and for various committees of the Board. The main function of the Board is to co-ordinate,

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<sup>32</sup> Section 33(1)(b), (d) and (k) respectively.

<sup>33</sup> Section 43

<sup>34</sup> Coastal Profile of the Erongo Region – August 1999, page 136.

<sup>35</sup> *Id.*

<sup>36</sup> Bill 2003 version

evaluate, and supervise spatial planning, the subdivision and consolidation of land, and establishment or extension or urban areas.

Part II of the Bill deals with national, regional and urban structure plans in order to “guide the social and economic development and land use patterns of Namibia, its regions and local authority areas, as the case may be.”<sup>37</sup> The Bill requires the Minister of Regional and Local Government and Housing and Rural Development to prepare a national structure plan that deals with the spatial aspects of Namibia’s social and economic development in a manner that the general welfare of Namibia is most effectively promoted.<sup>38</sup> Regional councils are empowered (but not required to prepare a regional structure plan or sub-regional structure plans to deal with the spatial aspects and potential for social and economic development of the region or part of the region in a manner that most effectively promotes the general welfare of that area.<sup>39</sup> Similarly, local authorities may prepare urban structure plans and indeed must prepare urban structure plans for the urban areas under their control if they wish to be granted the status of an “authorised local authority” by the Minister.<sup>40</sup> An urban structure plan must deal with the spatial development of the local authority area concerned in order to secure orderly, co-ordinated, efficient and environmentally sound urban development and proper use of land in a manner that most effectively promotes the general welfare and order of the area.<sup>41</sup> It is important to appreciate that a regional urban structure plan is a strategic planning instrument and does not confer or take away any use rights in respect of land<sup>42</sup> but an urban structure plan may contain conditions authorising an authorised local authority to amend an existing zoning scheme that is in force within its area.<sup>43</sup>

The draft Urban and Regional Planning Bill Regulations deal in detail with the procedures for preparing structure plans and zoning schemes and their content. The regulations specify the objectives of structure plans in general as well as elaborating on the specific objectives of the national structure plan, regional structure plans and urban structure plans. The regulations make it clear that such plans must take account of environmental matters. For example, the regulations refer to the need to take account of: the “environmentally sound and proper use of land”; the optimum use of the land for a variety of uses, including wild life; and the sustainable development of available natural and human resources.<sup>44</sup>

Part III of the Bill deals with zoning schemes, which unlike structure plans, must determine use rights and provide for control over use rights and over the use of land in the local authority area.<sup>45</sup> Zoning schemes must be prepared in areas where urban structure plans exist and may be prepared in relation to other areas. It is important to appreciate that such zoning schemes will constitute the primary mechanism for controlling the use of land in Namibia and the Bill requires every local authority to “comply and enforce compliance with

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<sup>37</sup> Section 12(7).

<sup>38</sup> Section 12(1) as read with Section 13(1).

<sup>39</sup> Section 12(2) as read with Section 16.

<sup>40</sup> Section 12(3) and (4) as read with Section 27.

<sup>41</sup> Section 16(1).

<sup>42</sup> Section 25(1).

<sup>43</sup> Section 24(1).

<sup>44</sup> See regulations 4(1), 4(2)(d), and 6(b).

<sup>45</sup> Section 28(5).

this Act, a zoning scheme and conditions imposed under or in terms of the Act or a rezoning scheme ...”

### **Namibian Ports Authority Act 2 of 1994 / Regulation in Terms of the Port Authority Act**

The Act establishes the Namibian Ports Authority (NPA) to undertake the management and control of ports and lighthouses in Namibia and the provision of related facilities and services. The NPA is given a range of functions, including the authority to:

- (c) to operate, or construct and operate, lighthouses, and to provide and maintain other aids to navigation, whether within a port or within the territorial waters of Namibia or along the coast of Namibia;
- (d) to provide and maintain surveillance aids and other lifesaving equipment to monitor the movement of ships;
- (e) to provide and maintain lifeboats and other lifesaving equipment;
- (f) to provide and maintain search and rescue services;
- (g) to undertake dredging services in ports and channels and approaches thereto;
- (h) to provide tug and pilotage services;
- (i) to protect the environment within its areas of jurisdiction;
- (j) subject to such terms and conditions as may be agreed upon with the Minister under section 27(5) of the Prevention and Combating of Pollution of the Sea by Oil Act, 1981 (Act 6 of 1981) to store, maintain and deploy oil recovery equipment for the purpose of combating pollution of the sea.”<sup>46</sup>

NPA also has powers:

- to control the movement of goods or passengers within a port;
- to raise, remove or destroy any sunken, stranded or abandoned ship or wreck, within the Authority’s area of jurisdiction or to remove any other obstacle that may endanger ships entering or leaving port, and to recover the costs incurred from the person responsible; and
- to exercise control over the waters of any port and the approaches thereto, and to control all marine traffic in any port.<sup>47</sup>

Regulations in terms of the Port Authority Act require persons to obtain licenses and permits for a wide array of activities including landing, shipping, transshipping, stevedoring, engaging in the trading of goods or providing a ferry or diving service.<sup>48</sup> Mine operators and contractors should ensure compliance with the provisions of these regulations.

Regulation 47 prohibits the deposit of foreign material. The regulation states:

- (1) No person shall throw, discard, discharge or deposit or allow to be thrown, discarded, discharged or deposited within a port any article, material or liquid which is liable to cause an obstruction, danger, pollution or nuisance.

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<sup>46</sup> Section 14.

<sup>47</sup> Section 3.

<sup>48</sup> Regulation 3.

- (2) Any expenses and claims that may be incurred by NamPort in recovering or removing any article, material or liquid referred to in sub Regulation (1) shall be borne by such person, master, owner or agent.

This regulation may be of relevance in the process of loading bulk sulphur or uranium. Regulations 86 and 87 allow the Port Operations Manager to order the removal or destruction of dangerous or offensive cargo or goods.

Regulation 88 prohibits of certain types of goods in a warehouse, including *inter alia* acids; asphalt; bricks; copper bars; drums; flammable liquid, in drums; machinery; mineral concentrates; ores; sand; steel; sulphur in bulk; tar; timber (rough). Listed materials must be stored or deposit in the open, at the discretion of the Port Operations Manager.

### **Marine Traffic Act, 2 of 1981**

The main purpose of the Marine Traffic Act is to regulate marine traffic in Namibia and it deals with a range of matters such as the right of innocent passage through Namibian waters. The Act empowers the Minister of Works, Transport and Communication to make regulations regulating marine traffic in the territorial sea and internal waters, including the prescribing of sea lanes and the traffic separation schemes for ships in general or for any class of ship or for ships carrying nuclear or other dangerous or noxious substances.<sup>49</sup>

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<sup>49</sup> Section 14(a).