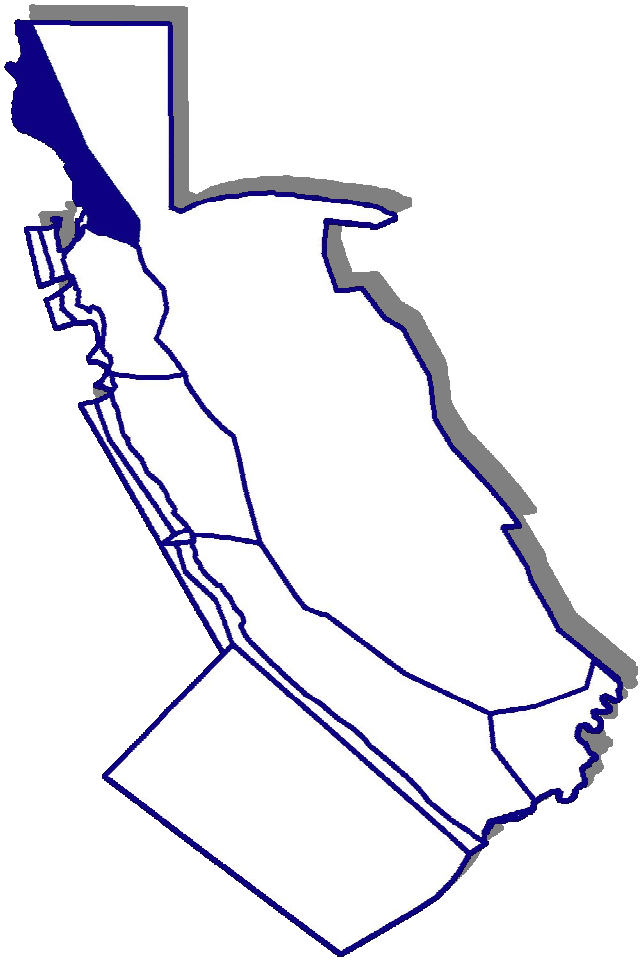

Environmental Management Programme Report for Namdeb's Mining Licence 46 (Douglas Bay)

November 2018

NAMDEB

A Namibia De Beers Partnership

Environmental Management Programme Report for Namdeb's Mining Licence 46

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Acknowledgements

This report is a team effort which required input from a multitude of people at Namdeb. Thanks to all.

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Abbreviations and glossary

DWAF	Department of Water Affairs and Forestry
EMP	Environmental Management Plan
EMPR	Environmental Management Programme Report
EMS	Environmental Management System
ESA	Early Stone Age
IUCN	International Union for the Conservation of Nature (former World Conservation Union)
LSA	Later Stone Age
MSA	Middle Stone Age
MET	Ministry of Environment and Tourism
MFMR	Ministry of Fisheries and Marine Resources
MHSS	Ministry of Health and Social Services
ML	Mining Licence
MME	Ministry of Mines and Energy
MSE	Middle Stone Age
Nemcom	Namdeb Executive Management Committee
SSSI	Site of Special Scientific Interest
TAC	Total Allowable Catch

Figures

Chapter 1 Summary

1.1 Introduction

A series of eight Environmental Management Programme Reports linked to Namdeb's licence areas forms the backbone of Namdeb's Environmental Management System (EMS). This report is an update of the 1997 EMPR for ML46 (Douglas Bay mining licence). As this is not a conventional environmental assessment for a new project, the assessment process and structure of the report have been adapted. The main report is deliberately concise and refers to supplementary information in an annex.

1.2 Description of activities

No mining or exploration is currently planned in ML46. All previous small contractor sites have been rehabilitated.

1.3 The natural environment in ML46

The natural environment in Douglas Bay comprises largely unspoiled dunes, rocky shores, reefs, sandy beaches, saltpans, rocky outcrops and mountains. The Kowisberge, Anichab pan, Ichaboe island, coastal dune hummocks, offshore rocks and reefs as well as historic and archaeological sites are environmentally sensitive. A large number of endemic plant species – one restricted to the Kowisberge – and breeding sites of red-listed birds such as Damara Terns at Anichab, as well as penguins and cormorants on the islands reveal the environmental importance of the licence area.

Figure 01. Small-scale mining by contractors took place on the beaches in ML46. These former mining sites are now rehabilitated.

1.4 The socio-economic environment

Namdeb's overall contribution to the Namibian economy is substantial, with additional major positive spin-offs for secondary industries such as suppliers, service providers and contractors, a large part from the Karas region.

Many sites of historic importance occur in the Douglas Bay mining licence, with Charlottental presenting an excellent and easily accessible example of diamond mining operations at the turn of the 20th century.

1.5 Environmental management to date

Namdeb's Environmental Section with currently seven full-time staff is responsible for all facets of environmental protection. This includes planning, performance reporting, assurance, impact monitoring and stakeholder engagement. One environmental officer is dedicated to the Elizabeth Bay, Bogenfels and Douglas Bay licence areas, referred to by Namdeb as Northern Coastal Area. Namdeb's operations are ISO14001:2015 certified and follow De Beer's and Anglo American's corporate standards.

1.6 Environmental assessment

There are no activities in ML46 and therefore no formal impact assessment is required. However, activities in other licence areas also affect ML46.

1.7 Environmental management plan

The Environmental Management Plan outlines some overall environmental tasks.

1.8 Annex

The annex summarises the authors' credentials, presents all applicable legislation and provides a list of reviewed literature and Namdeb's environmental policies and procedures applicable to environmental management in ML46.

Chapter 2 Introduction

A series of eight Environmental Management Programme Reports linked to Namdeb's licence areas forms the backbone of Namdeb's Environmental Management System (EMS). This report is an update of the 1997 EMPR for ML46 (Douglas Bay mining licence). As this is not a conventional environmental assessment for a new project, the assessment process and structure of the report have been adapted. The main report is deliberately concise and refers to supplementary information in an annex.

2.1 Background

The backbone of Namdeb's environmental management is a series of eight comprehensive Environmental Management Programme Reports (EMPRs) linked to each of Namdeb's mining licence areas. These were compiled during 1995-1997. Management actions identified and described in these reports were in subsequent years supplemented by external Environmental Impact Assessments, Namdeb internal risks assessments and amendments to environmental assessments for altered projects. The resulting management actions have been incorporated in an environmental management database which is the core tool of Namdeb's Environmental Management System (EMS).

Implementation, additions, amendments and closing of management actions happen continuously to keep the EMS up-to-date. Some 20 years have passed since the first EMPRs and subsequent EIA reports were compiled. There is now a need to consolidate, update and review all these documents. Environmental management at Namdeb is centred on the ISO14001 certified Environmental Management System. This EMPR will form part of Namdeb's EMS.

2.2 Diversions from traditional approach to environmental assessment reports

This report is a revision of an existing EMPR and not linked to a new project. Therefore the approach prescribed in Namibia's Environmental Management Act (Act 7 of 2007) has been adapted to the current situation. Nevertheless all components of an environmental assessment are included. Scoping is included in this EMPR not as a separate report, but in the form of an impact/risk assessment workshop, which ensured that no new environmental impacts were overlooked. Stakeholder engagement forms part of Namdeb's continuous environmental management (see chapter 6) and no specific public participation process was undertaken. Furthermore, as there is a wealth of information backing this EMPR, this report is deliberately concise and describes the most pertinent aspects that need to be understood by a reader who may not be familiar with the mining

operations and the environment in which the activities take place. The report provides the current status of environmental aspects at Namdeb and a view of anticipated activities within the next three years.

Relevant supplementary information, such as legal requirements and statutory aspects, corporate policies, guidelines and reporting are therefore provided in an annex. The structure of the report is illustrated in the figure below and the table of contents. The consultants who compiled this report have undertaken environmental baselines, assessments and monitoring for Namdeb for decades and have a combined experience of over 40 years in this area. They are therefore well familiar with all aspects relevant to this assignment (Annex 1).

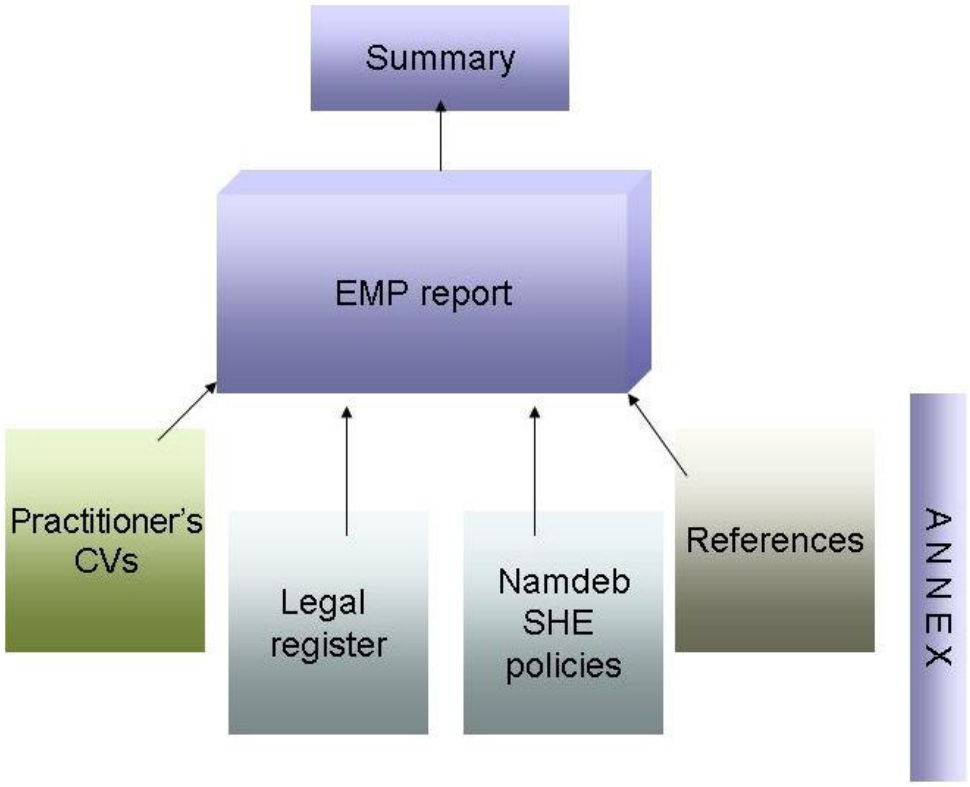

Figure 02. Structure of the Environmental Management Programme (EMP) report.

2.3 Locality, company, legal and statutory requirements

Namdeb Diamond Corporation (Pty) Ltd mines alluvial diamonds in the south-western part of Namibia, now in the Tsau//Khaeb (Sperrgebiet) National Park. The company is equally owned by the Government of the Republic of Namibia and De Beers Centenary forming Namdeb Holdings. Namdeb Holdings owns Namdeb and De Beers Marine Namibia. Namdeb is lead by the Chief Executive Officer (CEO), and operations are governed by the OPSCO team (mine managers, strategic projects and mineral resources), headed by the Chief Operating Officer (COO). OPSCO and departmental heads form the Namdeb Executive Management Committee (Nemcom), which reports directly to the Namdeb Holdings Board. The Environmental Manager reports to the department head Mineral Resources and Environment.

Namdeb Holdings holds nine mining licences on land and offshore. Namdeb holds eight of these licences of which Mining Licence 46 is the northern-most land-based licence.

This EMPR is a requirement of the Minerals Act (1992, Clause 14), Minerals Agreement of 1994 and the Environmental Management Act (Act 7 of 2007). These and all other legislation relevant to this report are provided in Annex 2.

The Douglas Bay licence area (ML46) is a 5-18 km wide strip of land narrowing northwards of Lüderitz and bordered in the west by the Atlantic Ocean. Areas in Namdeb's mining licence ML46 are zoned as national park, managed resource protected area, protected landscape and strict nature reserve (Ministry of Environment and Tourism's park management plan of 2013).

Although ML46 has no marine portion, the licence area borders the Namibian Islands Marine Protected Area to the west (Currie et al. 2008).

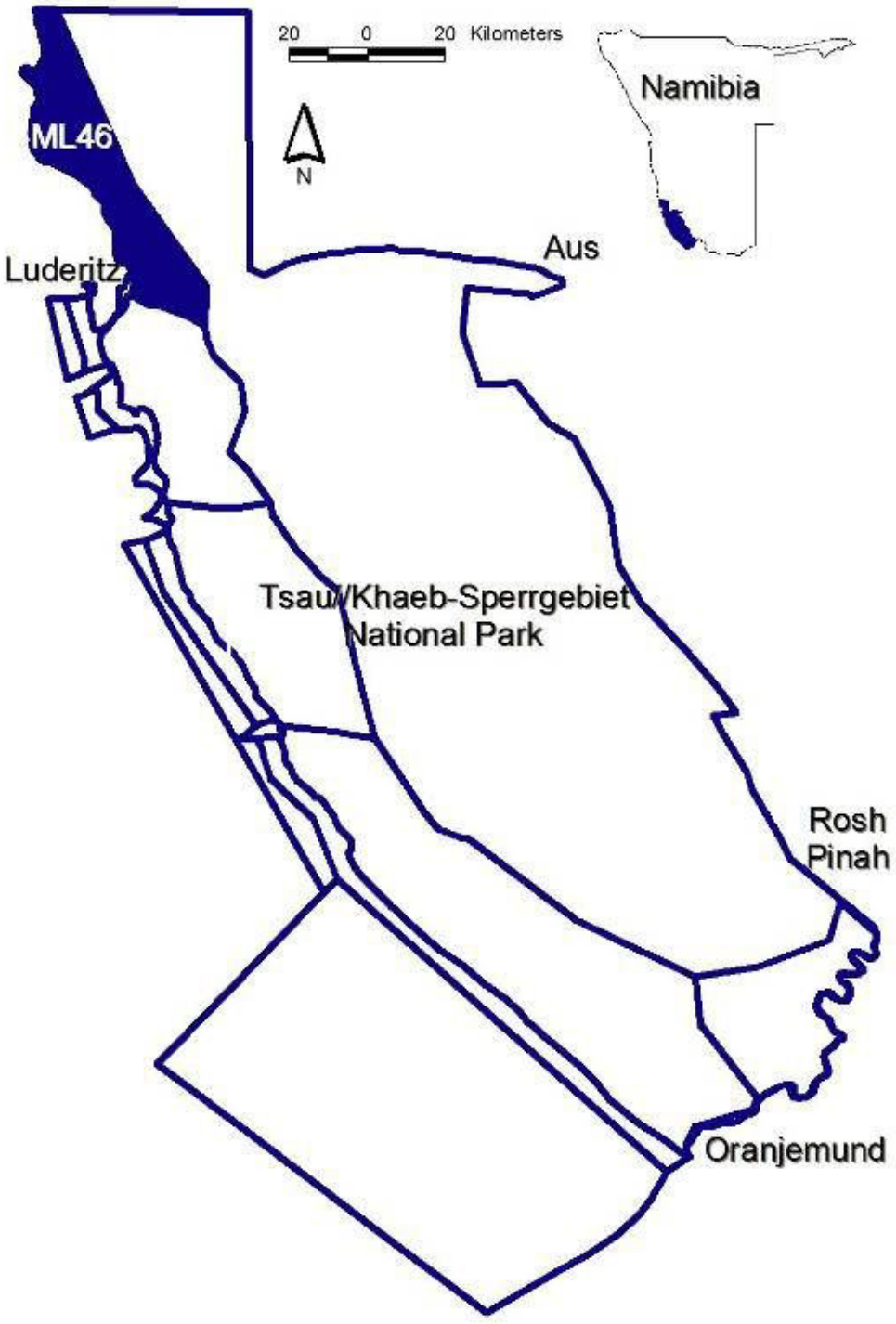

Figure 03. The position of mining licence area 46 in Namibia and the Tsau//Khaeb (Sperrgebiet) National Park.

Chapter 3 Description of activities

No mining or exploration is currently planned in ML46. All previous small contractor sites have been rehabilitated.

Diamond deposits in the Douglas Bay licence area occur in the form of marine, beach and aeolian deflation deposits. With the exception of the historic operations at Charlottental and Schmidtfeld in 1912, these deposits have not been considered viable for capital-intensive mining and small operators have mined in this area on and off since their discovery.

3.1 Exploration

No exploration is currently undertaken in ML46, but Namdeb has in the past repeatedly sampled in the Charlottental area and Anichab pan to establish whether mineable deposits still remain.

3.2 Mining

No mining is planned in ML46 during 2018-2021.

In the past land-based, small-scale mining was undertaken by contractors in the beach area (up to 100m landward of the high water mark) in the form of beach mining behind coffer dams and land-based divers accessed the shallow water. Their land-bases consisted of mobile containers and infrastructure which has now all been removed and the sites rehabilitated.

3.3 Infrastructure and services

Only tracks to the various old mining sites pass through the licence area.

3.3.1 Historic infrastructure

Historic infrastructure related to the previous mining operations is found at Charlottental and Schmidtfeld, where old processing plants, excavators, screening facilities and supporting infrastructure like accommodations are gradually eroded by the harsh environmental conditions. There are also remains of prospecting activities from the last 100 years throughout the licence area and guano collectors left buildings on Ichaboe island.

3.4 Rehabilitation

The remains of contractor operations had been removed by Namdeb and the sites rehabilitated during 2007-2008.

Figure 04. All infrastructure removed, only few, low tailings heaps remain of the contractor activities after rehabilitation. These were left to be reshaped by the wind.

Figure 05. A typical contractor camp. These have all been removed now.

Chapter 4 The natural environment in ML46

The natural environment in Douglas Bay comprises largely unspoiled dunes, rocky shores, reefs, sandy beaches, saltpans, rocky outcrops and mountains. The Kowisberge, Anichab pan, Ichaboe island, coastal dune hummocks, offshore rocks and reefs as well as historic and archaeological sites are environmentally sensitive. A large number of endemic plant species – one restricted to the Kowisberge – and breeding sites of red-listed birds such as Damara Terns at Anichab, and penguins and cormorants on the islands reveal the environmental importance of the licence area.

The licence area is positioned in the southern Namib Desert, which comprises parts of the Desert - and Succulent Karoo Biomes. The Succulent Karoo Biome is a global biodiversity hotspot (Myers et al. 2000) and managing impacts on biodiversity is therefore critical. Overall, the southern Namib coastline has been identified as environmentally sensitive because of abundance of bird breeding sites, seal colonies and associated predators, such as brown hyena.

In more detail, environmentally sensitive areas in the Douglas Bay licence area are:

- Coastal dune hummocks,
- Kowisberge,
- Bird breeding sites (Anichab Pan, Ichaboe island, offshore rocks),
- Rocky shores, subtidal reefs and sandy beaches,
- Historic (Charlottental, Schmidtfeld, Douglas Bay) and archaeological sites and
- Other Sites of Special Scientific Interest.

Figure 06. Cape Cormorants frequent ML46. These are now classified as endangered (Simmons et al. 2015).

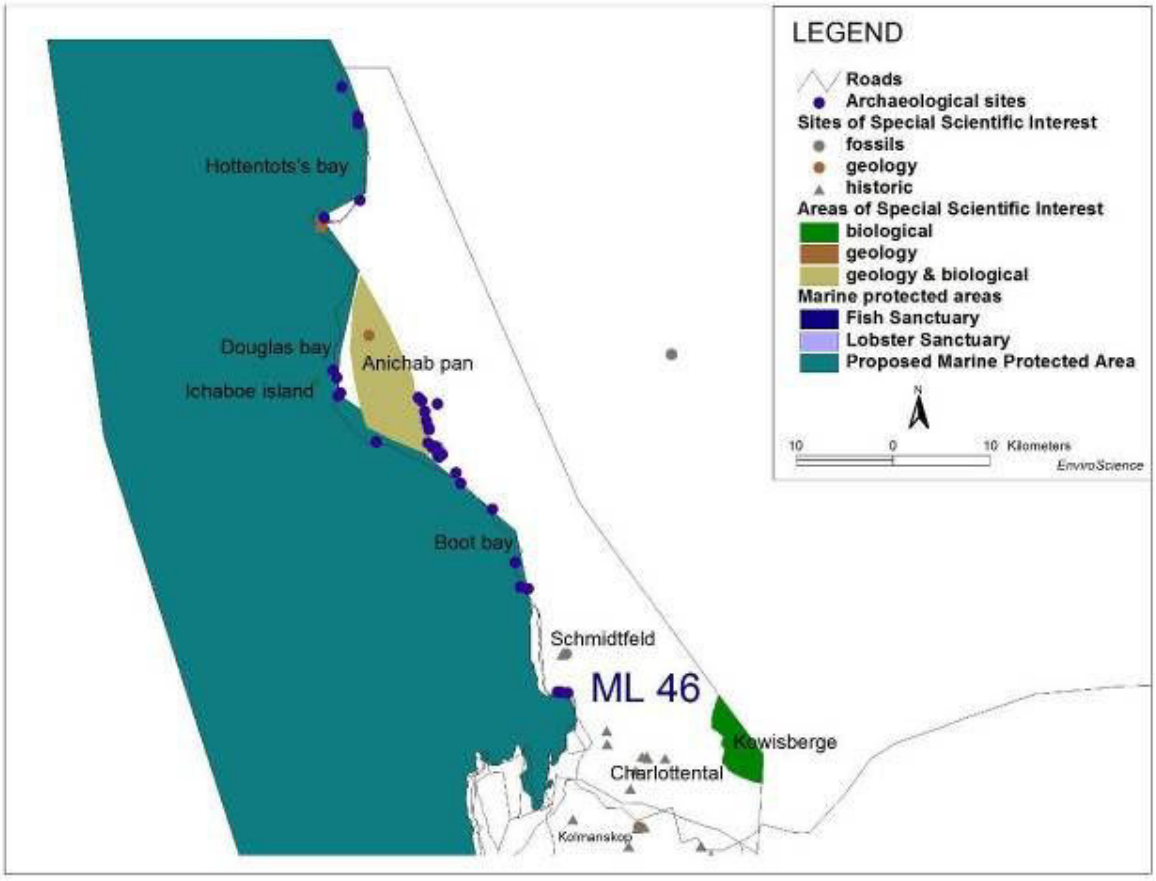

Figure 07. Sites of Special Scientific Interest (SSSI's) and environmentally sensitive areas in ML46 (blue line denotes the licence boundary).

4.1 Climate

The approximate northern boundary of the Succulent Karoo Biome runs through the Douglas Bay licence area, so winter- and summer-rainfall regimes can influence the climatic conditions here. Extremely low rainfall (annual mean rainfall at Lüderitz 16.4 mm), regular fog (between 50-75 days per year in the Lüderitz area) and year-round strong, southerly winds (77% frequency in summer, 57% in winter, Van der Merwe 1983) characterise the climate. Temperatures are moderate (mean annual temperature 16ºC at Lüderitz) and evaporation much lower than inland (around 2600 mm per annum). Easterly, warm bergwinds occur occasionally in winter, often producing sandstorms (Zoutendyk 1992). Southerly winds, aridity and regular fog are the overriding climatic conditions shaping land and life in the licence area.

4.2 Geology, geomorphology and palaeontology

Very old rocks of the Namaqua Metamorphic Complex (1,500 Ma) are exposed in the Douglas Bay licence area in the form of headlands composed of metasedimentary rocks and slightly more extensive outcropping of leucocratic

granite south of Anichab pan (Miller 2008). All other areas are covered by recent Quaternary deposits of sand and salts, overlying in places the aeolian deflation diamond deposits. The perpetual, strong winds move enormous amounts of sand all year round.

Despite the extensive sand cover obscuring most deposition sites, one Miocene fossil has been discovered in ML46 (Pickford & Senut 2000). Five localities have been identified as Sites of Special Scientific (geological) Interest illustrating remnants of former beaches and thus related to the diamond history in this area (Burke 2015a).

4.3 Landforms, soils and hydrology

Dune fields of the south-western part of the Namib sand sea cover the majority of the licence area. So mobile dunes, coastal dune hummocks, sandy beaches, saltpans and rocky plains are characteristic landforms in the licence area, with a few rocky outcrops and headlands separating the otherwise sand-dominated landscape. These landforms continue out to sea as submarine ridges, islands, exposed rocks and headlands (Pisces 2010). Prominent bays from south to north are Boot, Douglas and Hottentot's bay.

Littoral sands dominate along the coast and calcareous, sandy soils further inland. One spring occurs at the southern end of the coastal Anichab salt pan.

Figure 08. Douglas Bay with Ichaboe island in the background.

4.4 Flora and vegetation

4.4.1 Vegetation

The vegetation is characterised by a fog-dependent flora adapted to endure strong winds and sand-blasting conditions. Three vegetation types were overall delineated – the northern barchan grasslands, Hottentot's Bay salt flats and Kowisberge dwarf shrubland (Burke 2006). Grasses and succulent shrubs are dominant, the shrubs mostly restricted to the stable surfaces of rock outcrops, the grasses growing in the dunes. The extensive sand sheets are mostly vegetation-free, but support scattered hummocks of the dune grasses *Stipagrostis sabulicola*, *S. lutescens* and other hardy grasses, such as *Cladoraphis spinosa*, in interdune valleys and at the base of dunes. In the rare event of rains, herbs such as *Foveolina albida, Grielum humifusum* and *Monsonia ignorata* enliven the dunes with specs of yellow and white flowers. Some nara plants (*Acanthosicyos horridus*) and capers (*Capparis hereroensis*) have established large thickets around the freshwater spring at Anichab.

The coastal hummocks are formed by *Salsola nollothensis* and *Cladoraphis cyperoides*, while the rocky, more stable surfaces support low succulents shrubs such as *Brownanthus marlothii, Drosanthemum paxianum* and *Lycium tetrandrum*.

A small corner of the Kowisberge extends into the south-eastern corner of the licence area. The Kowisberge are one of the important biodiversity hotspots in the Sperrgebiet and are characterised by occurrence of many endemic plant species (Burke 2004). They are surprisingly well vegetated, considering aridity and the constant exposure to sand-blasting conditions. The vegetation is dominated by the succulent dwarf shrubs *Euphorbia cibdela* and *Zygophyllum clavatum*, but accompanied by a remarkable diversity of over 200 plant species. These include a large number of species of conservation concern, including one plant species endemic to this mountain and adjacent inselbergs (i.e. does not occur anywhere else in the world) – *Juttadinteria simpsonii*. *Adromischus, Crassula, Eberlanzia, Psammophora, Lithops, Stapelia* and *Tylecodon* species are some representatives of protected species.

4.4.2 Plant endemism

The Sperrgebiet is characterised by a remarkably high level of endemism (Burke 2004), to the extent that some species only occur in Namdeb's licence areas. This is the case for 14 species, while another 11 plant species occur mainly in Namdeb's licence areas (more than 65% of their range). Considering that the entire or more than 65% of the species' range in the case of near-endemics, of the world population of these plants occur in Namdeb's licence areas, they deserve special consideration. These endemics are mostly coastal species with a narrow distribution range limited to Namdeb's section of the southern Namib coastline and adjoining inland areas. Although some are fairly abundant within their range (e.g. *Limonium dyeri*) Namdeb's licence areas are the only place in the world where they occur. In the Douglas Bay licence area these include *Limonium dyeri, Lithops optica, Othonna clavifolia* and *Synaptophyllum juttae*.

Figure 09. Two plant species only occur in Namdeb's coastal licence areas and are present in the Douglas Bay licence area – *Synaptophyllum juttae* (top left), and *Limonium dyeri* (bottom right). *Eremothamnus marlothianus* (bottom left) and *Tylecodon schaeferianus* (top right) are near-endemics and almost restricted to Namdeb's licence areas

4.5 Wildlife

4.5.1 Invertebrates

Although information on invertebrates is scanty, a high level of endemism (i.e. range-restricted species) is expected in many invertebrates groups and the coastal habitats have been identified as environmentally sensitive as many endemic species are expected to be associated with these habitats (Marais 1993).

4.5.2 Reptiles and amphibians

As a transitional area between summer and winter rainfall, elements of both faunas occur and reptiles are well represented in the study area. Several species of reptiles and amphibians (i.e. frogs), which may occur in the study area are of national conservation importance, such as Desert rain frog (*Breviceps macrops*), Namaqua dwarf adder (*Bitis schneideri*) and Cape sand lizard (*Pedioplanis laticeps*). Most of these are associated with coastal hummocks (Griffin 1997b).

4.5.3 Mammals

Of the 45 species of mammals recorded in the Sperrgebiet, gemsbok (*Oryx gazella*), springbok (*Antidorcas marsupialis*), brown hyena (*Hyena brunnea*) and black-backed jackal (*Canis mesomelas*) are the only larger mammals expected in ML 46.

Less conspicuous, but nevertheless of ecological importance are insect eaters, e.g. the Namib Golden Mole (*Eremitalpa granti*), and rodents such as the solitary whistling rat (*Paratomys littledalei*) and pygmy gerbil (*Gerbilluris paeba*). Large populations of small rodents occur on the inselbergs and plains, supporting predators such as carnivores, snakes and birds of prey.

4.5.4 Birds

An impressive number of coastal and pelagic seabirds occur along the ML 46 coastline. These include red-listed species such as African Oystercatcher (*Haematopus moquini*), Bank Cormorant (*Phalacrocorax neglectus*), Cape Cormorant (*P. capensis*) and Crowned Cormorant (*Microcarbo coronatus*), Black-browed Albatross (*Diomeda melanophris*), Black-necked Grebe (*Podiceps nigricollis*), Cape Gannet (*Sula capensis*), Chestnut-banded Plover (*Charadrius pallidus*), Damara Tern (*Sternula balaenarum*), Greater (*Phoenicopterus ruber*) and Lesser Flamingo (*Phoenicoporrus minor*), Hartlaub's Gull (*Chroicocephalus hartlaubii*), African Penguin (*Spheniscus demersus*), Sooty Shearwater (*Ardenna grisea*) and White-chinned Petrel (*Procellaria aequinoctialis*) (Williams 1993; Avifauna database 2003). African Penguin and Cape Gannets breed on Ichaboe island. The endemic Dune Lark (*Calendulauda erythrochlamys*) has been observed in the licence area and the red-listed near-endemic Damara Terns nest on Anichab pan in large numbers, making it the largest Damara Tern colony in the south (Braby 2009).

4.6 Coastal environment

Biogeographically, the southern Namibian coastline falls into the cold temperate Namaqua Province, which extends from Cape Point to Lüderitz (Emanuel et al. 1992). The marine ecology of the ML46 coastline is shaped by coastal, wind-induced upwelling and is characterised by cold surface waters, high biological productivity, and highly variable physical, chemical and biological conditions (Barnard 1998). The Lüderitz upwelling cell is the most intense upwelling cell in the Benguela. Unlike most other seasonal upwelling cells along the southern African coast, the Lüderitz cell is a semi-permanent feature with the seaward extent reaching nearly 300 km offshore. Marine communities are largely ubiquitous throughout the southern African West Coast region, being particular only to substrate type or depth zone. These biological communities consist of many hundreds of species, often displaying considerable temporal and spatial variability (even at small scales).

Figure 10. Largely unspoiled coastline with rocky headlands, sandy beaches and adjoining sand plains and dune hummocks characterise the Douglas Bay license area.

Chapter 5 The socio-economic environment

Namdeb's overall contribution to the Namibian economy is substantial, with additional major positive spin-offs for secondary industries such as suppliers, service providers and contractors, a large part from the Karas region.

Many sites of historic importance occur in the Douglas Bay mining licence, with Charlottental presenting an excellent and easily accessible example of diamond mining operations at the turn of the 20th century.

5.1 Economic contribution

Mining makes a significant contribution to Namibia's Gross Domestic Product (GDP). In 2017 mining contributed 12.2% directly and 12.8% in real value to GDP (Chamber of Mines 2017). It also contributes to infrastructure and community development and employed 9,643 individuals permanently, 6,373 through contractors and 889 individuals on a temporary basis in 2017 (Chamber of Mines 2017). Mining accounts for 50% of exports from Namibia on average. It is the dominant economic sector in the Karas Region where Namdeb operates. Although employment rates are slightly above the national average, besides the formal sector (mining, fishing, agriculture) there are few other opportunities for employment, as subsistence farming is very marginal in this arid region. Developments in other sectors (e.g. tourism, manufacturing) progress very slowly.

Namdeb's turnover in 2017 was N$ 11.5 billion with a corporate tax bill of N$ 1.92 billion, royalty tax amounting to N$ 1.15 billion and export levies to N$ 71 million (Chamber of Mines 2017).

In addition to the direct contribution to Namibia's economy, Namdeb has a profound positive effect on secondary industries through suppliers, contractors and service providers supported by the diamond mining business.

5.2 Human resources

5.2.1 Employment and benefits

Namdeb offers its employees free housing or a housing and utility allowance to permanent employees. Over 74% of Namdeb's employees are members of the Mine Workers Union of Namibia. The Union is represented on human resources committees, home loan and medical schemes.

To address employees' and community expectations Namdeb has set up an incidents and grievance mechanism and is presently formulating an overarching stakeholder engagement plan (C. Neels, pers.comm. August 2018).

5.2.2 Skill development and training

Namdeb provides bursaries to promising, young Namibians for studies in technical disciplines and it has a graduate trainee programme which offers graduates job experience and on-the-job training through job attachments and work integrated learning opportunities.

5.3 Land use

The Douglas Bay mining licence falls into the Tsau//Khaeb (Sperrgebiet) National Park and most IUCN zoning categories apply in the licence area. Seal, Penguin and Ichaboe islands are habitat/species management areas (IUCN category IV), but fall outside the Namdeb licence area. Kowisberge receives strict nature reserve status (category Ia), the Charlottental area has been zoned as protected landscape (category V), the coastal strip as managed resource protected area (category VI) and the remainder as national park (category II) (MET 2013).

The entire stretch of coastline in ML46 is part of a marine protected area, with a specially protected zone around Ichaboe island.

There is a private concession at Hottentots' Bay to which the owners gain access through Namdeb's licence area.

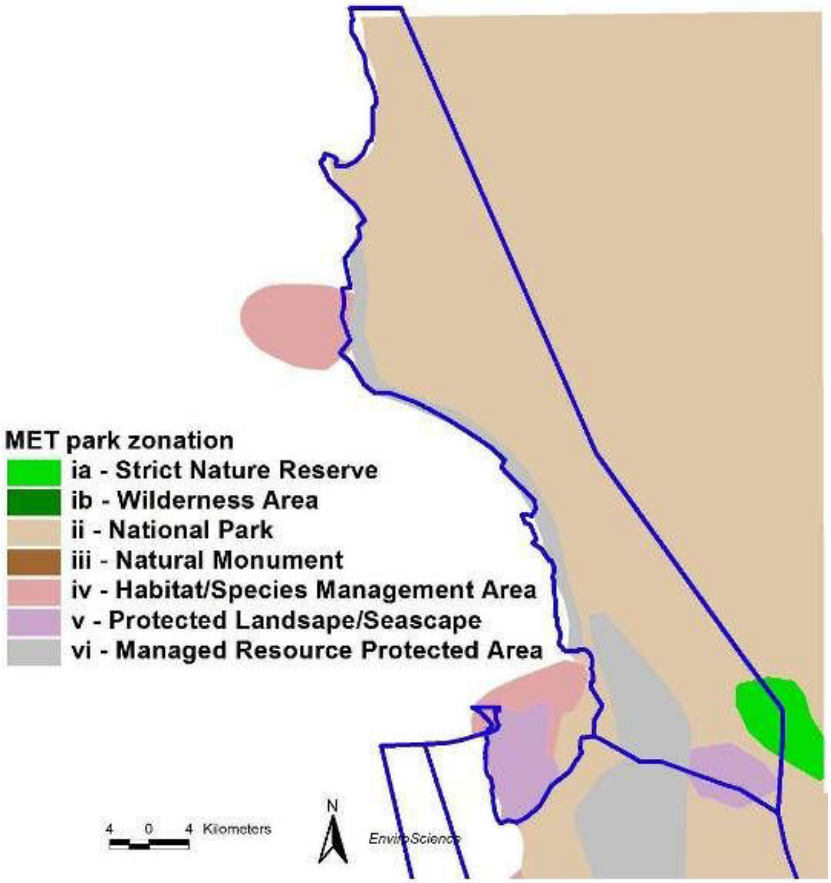

Figure 11. Zoning of the Tsau//Khaeb (Sperrgebiet) National Park in mining licence 46.

5.4 Cultural heritage

Artefacts of human occupation have been dated up to 300,000 years ago in the Sperrgebiet and people have frequented the coast repeatedly, drawn by the abundant marine resources and sustained by freshwater springs, like the one at Anichab pan. Human activities were, however, likely limited to good rain years in pre-historic times. Numerous Early, Middle and Later Stone age sites, including shell middens and graves, bear witness of pre-historic human activities (Noli 1995) which were particularly concentrated around Anichab pan.

More recent activities are related to mining, fishing and guano collecting. Guano collectors in the mid 1900s left buildings on Ichaboe island and some remains of their land base can still be found in the Douglas Bay beach area, including some graves. Guano collecting also took place at Hottentot's Bay, where a fish canning factory was operating in the past.

Diamonds were discovered at Charlottental already shortly after their discovery at Kolmanskop. These as well as the Schmidtfeld deposits were mined before 1920. Today, few structures bear witness of the previous mining activities at Schmidtfeld, but Charlottental still provides a nearly complete picture of historic diamond mining in this area with an old processing plant, an early bucket-wheel type excavator, screening facilities, plenty of supporting infrastructure like accommodations, remnants of railway lines and the mining landscape. There are also remains of prospecting activities from the last 100 years scattered throughout the area.

Figure 12. The old German plant at Charlottental, dating from the first mechanised diamond recovery in the 1910s.

5.5 Corporate social responsibility

The Debmarine – Namdeb Foundation was formed in 2015 with the vision of being a community partner in socio-economic development. For the year ended December 2017 the Foundation spent some N$ 3.4 million on different projects in its focus areas of education (17%), conservation and biodiversity (44%), youth empowerment (22%) as well as other projects (sport (6%) and disaster relief (11%)). In addition, Namdeb approved over N$ 260,000 under a separate social responsibility programme, largely supporting sports events and access to opportunities, 88% of which are in the Karas region (I. Hucke-Mcfarlane, August 2018).

Namdeb also has a social closure team which is developing strategies and programmes to deal with the social aspects of mine closure (C. Neels, pers. comm. August 2018).

Chapter 6 Environmental management to date

Namdeb's Environmental Section with currently seven full-time staff is responsible for all facets of environmental protection, such as planning, performance reporting, assurance, impact monitoring and stakeholder engagement. One environmental officer is dedicated to the Elizabeth Bay, Bogenfels and Douglas Bay licence areas, referred to by Namdeb as Northern Coastal Area. Namdeb's operations are ISO14001:2015 certified and follow De Beer's and Anglo American's corporate standards.

Environmental management at Namdeb today encompasses an intricate machine of components relying on and informing each other to address the challenges posed by mining diamonds profitable while taking cognisance of environmental protection. For the purpose of this EMPR the headings below structure this section. All aspects described below apply to ML46, as well as Namdeb overall.

Figure 13. The main components of environmental management at Namdeb.

6.1 Planning

Environmental impact assessments undertaken by external environmental practitioners, internal risk assessments undertaken by Namdeb environmental staff and specialist baseline studies are the tools used to inform project planning at Namdeb.

6.2 Performance reporting

Corporate environmental management at Namdeb requires reporting at a multitude of levels internally to De Beers and Anglo American peers, the Namdeb Executive Management Committee (Nemcom scorecard), the OPSCO team and the Head Mineral Resources and Environment and externally to the authorities. The figure below provides a summary of the key performance reporting tools.

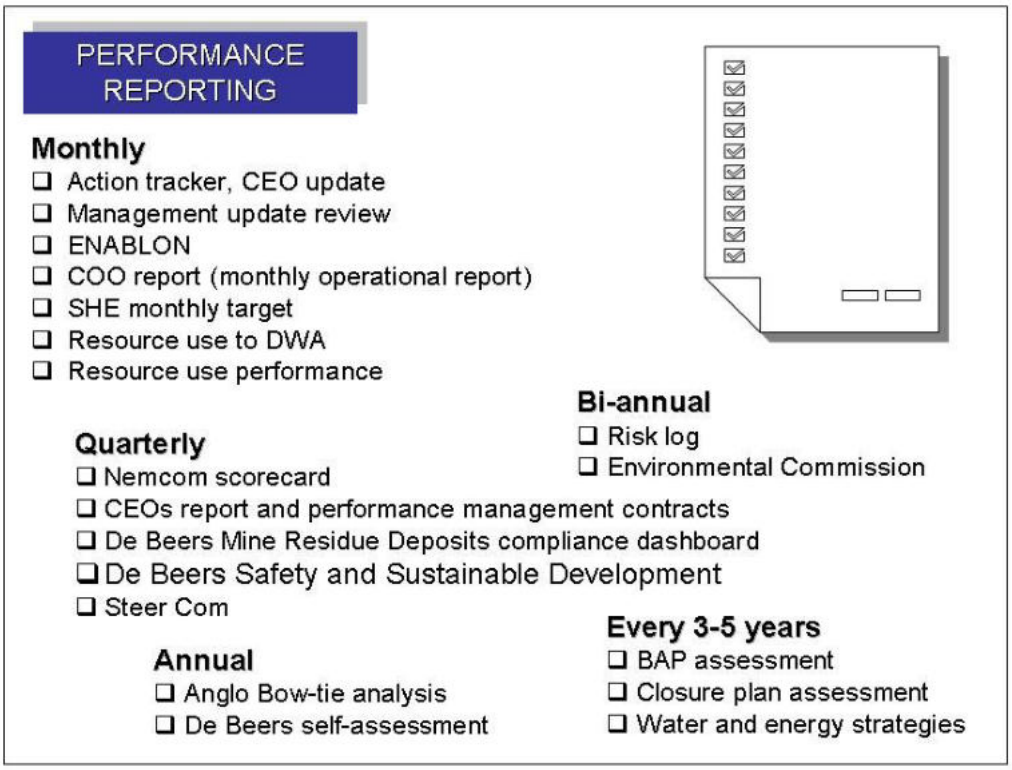

Figure 14. Elements of environmental performance reporting at Namdeb (BAP = Biodiversity Action Plan, CEO= Chief Executive Officer, COO= Chief Operational Officer, DWA= Department of Water Affairs, ENABLON= corporate reporting tool, SHE= Safety, Health and Environment).

ENABLON is Anglo American's computerised environmental platform which facilitates regular updates on-line and thus provides a real-time status of all Anglo-American / De Beers operations.

6.3 Assurance

Environmental performance at Namdeb is certified by auditors, externally and internally and backed by compliance visits from the authorities (e.g. Department of Water Affairs and Forestry) and corporate head office.

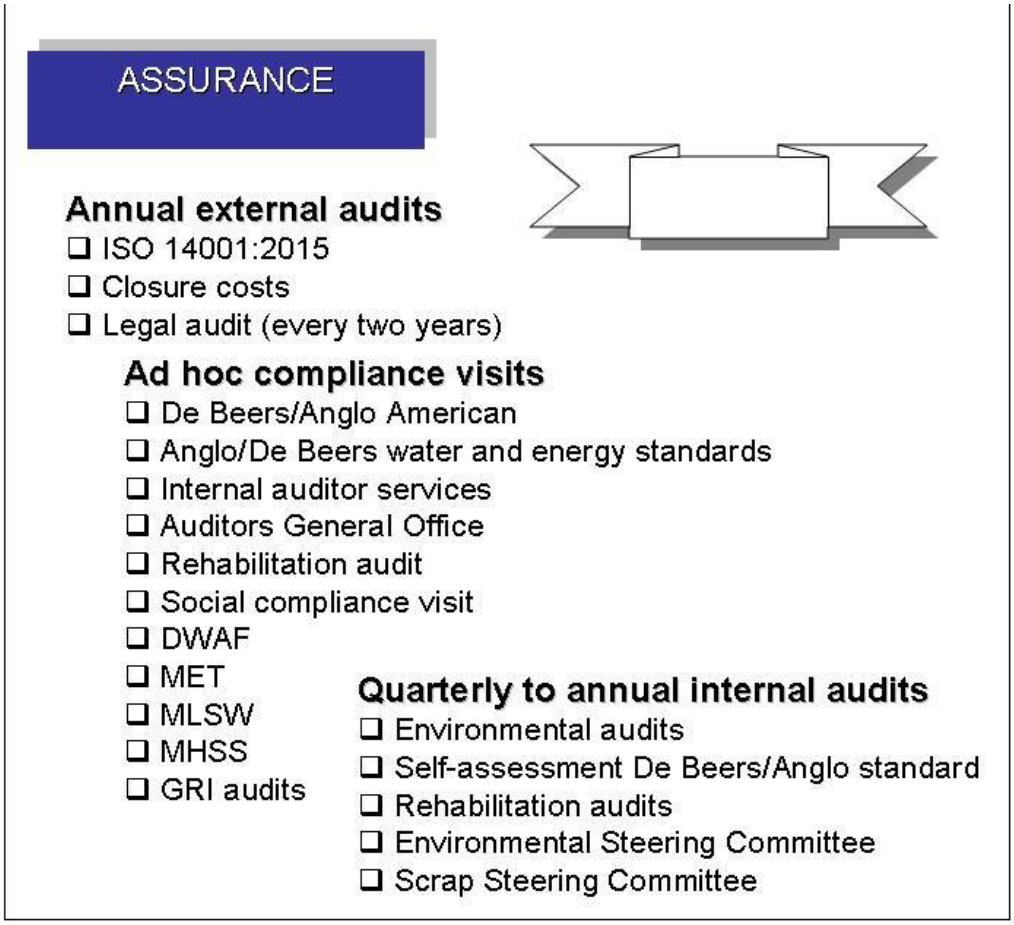

Figure 15. Environmental audits and certification at Namdeb (DWAF= Department of Water Affairs and Forestry, GRI= Global Reporting Initiative, MET= Ministry of Environment and Tourism, MLSW= Ministry of Labour, MHSS= Ministry of Health and Social Services).

All Namdeb's operations are ISO14001:2015 certified. Namdeb transitioned to the new ISO14001:2015 standard in May 2018.

6.4 Impact monitoring

Monitoring of resource use and environmental impacts go hand-in-hand. These are some of the critical functions of Namdeb's environmental section.

6.4.1 Resource use and pollution monitoring

Namdeb environmental staff regularly collates data on consumption of

- ◊ Seawater and freshwater,
- ◊ Fuel,
- ◊ Energy and
- ◊ Selected chemicals used in processing.

As there has been no activity in ML46 for several years, no resource use can be reported here. Likewise no pollution monitoring is undertaken in ML46.

6.4.2 Impacts on biodiversity

Relevant to monitoring of biodiversity in ML46 is Namdeb's support to the marine predator monitoring (southern right whales and selected birds (African Penguin, Bank Cormorant and Cape Gannets)) programme in 2015.

Figure 16. Black-backed jackal roaming coastal hummocks.

6.4.3 Rehabilitation monitoring

The rehabilitated contractor sites have been signed off by the Ministry of Mines and Energy and the Ministry of Environment and Tourism as acceptable and no further monitoring was therefore undertaken.

6.5 Stakeholder engagement

Effective environmental management cannot be achieved in isolation. Engaging stakeholders and creating awareness is therefore an important function of Namdeb's environmental staff. In addition to *ad hoc* public consultations related to impact assessments for specific projects, Namdeb has two regular, external channels for information exchange – the Marine Scientific Advisory Committee and the Namdeb Stakeholder Forum.

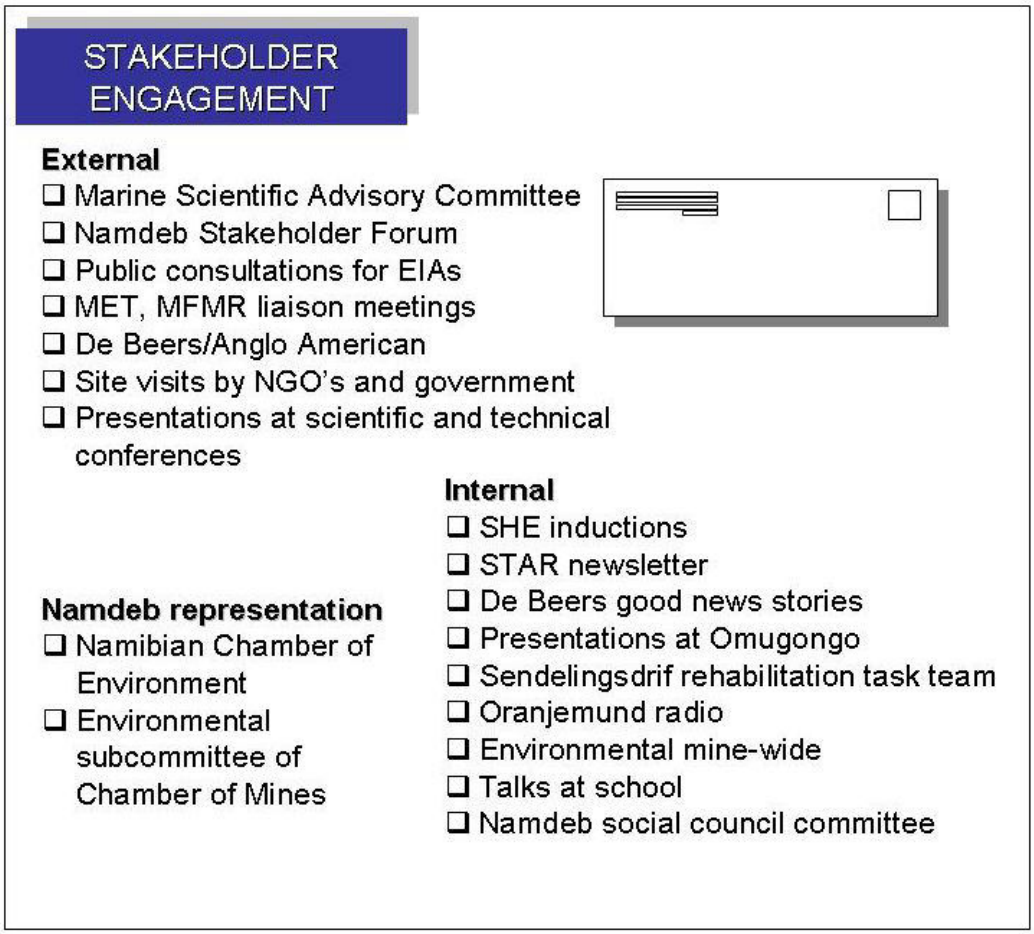

Figure 17. Stakeholder engagement, training and awareness in environmental matters at Namdeb (EIA= Environmental Impact Assessment, MET= Ministry of Environment and Tourism, MFMR= Ministry of Fisheries and Marine Resources, NGO= non-governmental organisation, SHE= safety, health and environment).

Awareness for environmental matters is created through environmental inductions, which form an integral part of the compulsory Safety, Health and Environment (SHE) inductions for all staff and contractors accessing Namdeb's operations. Contributions are also made to regular newsletters and presentations. Namdeb is represented on many working groups dealing with environmental matters affecting Namdeb's licence areas. Namdeb has committed to maintaining on-going communication with key stakeholders and would inform these should there be any mining or exploration activities in ML46 in future.

Chapter 7 Environmental assessment

There are no activities in ML46 and therefore no formal impact assessment is required. However, activities in other licence areas also affect ML46.

7.1 Cumulative effects

7.1.1 Commercial fishing

Commercial fishing has a considerable effect on fish populations. In this context the rock lobster industry is of particular relevance to ML46, as important fishing grounds are located offshore of the licence area. The commercial rock lobster fishery in Namibia is based in Lüderitz, and the northern fishing grounds stretch from Boot Bay beyond Hottentots Bay, with the richest grounds located just south of Hottentots Bay. There are no mining activities at present. Although long-shore drift from operations in ML45 and further south may not affect rock lobster directly, any future developments in ML46 need to take the rock lobster fishing grounds into account.

7.1.2 Climatic variations

The marine environment is most severely affected by changes in climate, which could result in sea level rise, shifts in large currents, changes to the physical conditions of seawater and effects on local climate. Which way these climatic changes will manifest themselves is still poorly understood, but there is a potential that these either intensify or alleviate the impacts of changes to the coastline resulting from mining. While a sea level rise would facilitate natural rehabilitation of the mined areas, a possible change in local weather patterns, such as storm patterns and wind regimes may have the opposite effect.

7.1.3 Other marine mining

Other licences, where offshore diamonds are actively mined, lie adjacent to the Douglas Bay mining licence. Activities in these adjoining offshore licences affect many of the same marine habitats such as subtidal reefs.

Namdeb's and other marine operators' activities, as well as the fishing sector have created a steady in-flux of job-seekers to Lüderitz, which puts a strain on the local municipality and existing social structures and services. Although there are presently no mining activities in Douglas Bay licence area, the potential of small-scale mining in ML46 still draws jobseekers.

Chapter 8 Environmental management plan

The Environmental Management Plan outlines overall environmental tasks, provides management actions for all high and significant impacts, describes rehabilitation activities and the required monitoring during operations and at closure.

Although no mining or exploration activities take place, overall tasks still apply in ML46. The management actions need to be seen in the context of an existing environmental management system which has been in place for over 20 years and where all measures applicable to common environmental aspects such as waste management, pollution control and protection of habitat, fauna and flora are well entrenched and routine. The management actions in this EMPR therefore focus on new aspects and prioritising existing management actions.

Objectives applicable to all management tasks in this EMP are described below and are not repeated for each task. All policies and procedures directly referred to in this EMP are provided in Annex 4, while the full suite of standard policies and procedures related to environmental management and applicable to all licence areas is included in the EMPR for ML43. The management objectives link directly to Namdeb's environmental policy.

The management objectives for this EMP are to:

- Protect the environment including pollution prevention and conserving natural habitats, flora and fauna and cultural heritage,
- Have no net loss of significant biodiversity,
- Avoid, substitute or reduce fresh water consumption and reduce carbon emissions from the 2004 baseline,
- Integrate waste management practices to reduce the generation of waste and the impact on the environment,
- Determine and evaluate fulfilment of the compliance obligations,
- Continually improve the effective implementation of the environmental management system,
- Enhance environmental performance,
- complete internal audits and effectively implement corrective action for nonconformities identified,
- Effectively and expediently report incidents, complete investigations and implement controls,
- Execute rehabilitation programs during mining operations and make provision for mine closure,
- Support environmental research and sustainable development initiatives that are relevant to our business,
- Create environmental awareness amongst our employees, suppliers, contractors and partners,
- Include the consideration of environmental issues in all business strategies and initiatives,

- ◊ Assess and, where practicable, reduce the environmental impact of the company's activities, products and services,
- ◊ Incorporate life-cycle considerations for significant procured goods and services and control and influence our suppliers and contractors,
- ◊ Consult and engage with interested parties on critical environmental matters of mutual concern,
- ◊ Make available suitable and adequate resources to achieve our environmental objectives, and
- ◊ Report on environmental performance publicly and provide assurance to shareholders.

The following legislation is directly applicable to the management actions (detail in Annex 2):

1. Mineral Act 1992
2. Minerals Amendment Act 8 of 2008
3. Namdeb's minerals agreement
4. Environmental Management and Assessment Act 7 of 2007 and regulations
5. Namibian Constitution Section 95(l)
6. Labour Act 6 of 1992, Act 11 of 2007 and amendment of 2012
7. Water Act 54 of 1956
8. Water Resources Management Act 11 of 2013
9. Forest Act 12 of 2001
10. Nature Conservation Ordinance 4 of 1975
11. National Heritage Act 27 of 2004
12. Marine Resources Act 27 of 2000 and regulations
13. Prevention and combating of pollution of the sea by oil Act 6 of 1981
14. Convention on Biological Diversity 2002
15. Ramsar Convention on Wetlands of International Importance especially as Waterfowl habitat, 1971
16. United Nations Framework Convention on Climate Change 1992

The responsibility for implementation of all mitigation measures lies with the Environmental Manager. All tasks are on-going activities.

OVERALL ENVIRONMENTAL TASKS	
Aspect	**Mitigation and control measures**
Reporting	◊ Follow ISO14001, MET, Group (Anglo American and De Beers) and Namdeb internal reporting standards (PR-EV-22, PR-EV-23) ◊ Improve environmental data capture, storage and retrieval
I&APs	○ Present relevant key features of updated EMPR at Namdeb regular stakeholder fora (PR-EV-16)

REHABILITATION AND CLOSURE	
Aspect	**Rehabilitation tasks**
Landscape rehabilitation	
Prospecting sites of Special Scientific Interest	◊ Demarcate "out of bounds" and secure, where necessary

Chapter 9 Annex

The annex summarises the authors' credentials, presents all applicable legislation and provides a list of reviewed literature and Namdeb's environmental policies and procedures applicable to environmental management in ML46.

Annex 1. The environmental practitioners

Antje Burke

Academic qualifications

1993: **Dr rer nat** (Ph D), Major: **Landscape Ecology**, Minors: Botany, Geography; Westfälische Wilhelms-Universität, Münster, Germany
1987: Diplom (M Sc equivalent), Major: **Geography**, Minors: Botany, Geology
1984: First degree (B Sc equivalent): Geography, Botany, Geology

Dr Burke has 30 years of professional experience in environmental research and management in Namibia, Germany, Israel, South Africa and Botswana. She has coordinated coordinated and participated in over 50 Environmental Impact Assessments, Management Plans, Audits, Sectoral Reviews and Natural Resource Assessments in Namibia – the majority in the mining and infrastructure sector. She is author of over 70 scientific publications, 50 of these in peer-reviewed, international journals and books, and over 100 popular and educational publications and is a scientific reviewer for eleven international journals. Dr Burke is a scientist widely recognised in her field of expertise. Her strong research background in environmental sciences, combined with in-depth practical experience, has enabled her to always maintain an exceptionally high standard, but unique and realistic approach in all her assignments.

Andrea Pulfrich

Academic qualifications

1995: **Dr rer nat** (Ph D), Major: **Fisheries Biology**, Minors: Oceanography, Aquaculture; Department of Fisheries Biology of the Institute for Marine Science at the Christian-Albrechts University, Kiel, Germany.
1987: MSc (Zoology), University of Cape Town, South Africa.
1983: BSc (Hons) (Zoology), University of Cape Town.
1982: BSc (Zoology and Botany), University of Natal, Pietermaritzburg.

Dr Pulfrich is the director of Pisces Environmental Services and has 29 years of professional experience in marine and coastal environmental sciences. Since its founding in 1998, Pisces Environmental Services has successfully completed a broad variety of assignments, ranging from technical field surveys and baseline data collection and environmental assessments, to sophisticated statistical analyses, reporting and public presentation of results. The Company has acquired a reputation among its clients for reliable, efficient, and result-orientated work. A great number of studies have been published in the internationally reviewed scientific literature. Through its links with research and government institutions, universities and industry, the Company keeps pace with advancements in marine sciences and technology, thereby applying up-to-date information and methodologies to its products.

Annex 2. Legislation and statutory requirements

Legislation	Applicability
MINING LEGISLATION	
Mineral Act, 1992	Rehabilitation requirements, environmental status prior to mining/prospecting, pollution control measures, liability for pollution
Minerals (Prospecting and Mining) Amendment Act, 8 of 2008	Requirement of EMPR
Diamond Act 13 of 1999 and regulations, GN 84 of 31 March 2000	Permits for handling diamonds
Environmental clause of Namdeb's Minerals Agreement	Requirement of EMPR
ENVIRONMENTAL LEGISLATION	
Environmental Management and Assessment Act 7 of 2007; List of activities that may not be undertaken without Environmental Clearance Certificate, GN 29 of 2012; Environmental Impact Assessment Regulations, GN 30 of 2012	Requirements for and process of environmental assessments
Draft Regulations for Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA), 2008 and Draft procedures and guidelines for Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP), 2008	Contents of strategic environmental assessments, Environmental Impact Assessments and Environmental Management Plans
Namibian Constitution Section 95(l)	Use of natural resources, protection of environment, biodiversity and ecosystems
Hazardous Substances Ordinance, 14 of 1974	Declaration and handling of hazardous substances
Labour Act 6 of 1992, Regulations relating to the health and safety of employees at work, GN 156, GG 1617 of 1 August 1997	Protection of employees from hazardous substances, incl. asbestos
Atmospheric Pollution Prevention Ordinance, 11 of 1976, prohibition of the import of ozone depleting substances, GN 281, 31 December 2010	Permitting of fuel burning appliances, prohibition of ozone-depleting substances
Atomic Energy and Radiation Protection Act, 5 of 2005; 1A.1 Radiation Protection and Waste Disposal Regulations, GN 221 of 18 November 2011	Handling, transport and disposal of radioactive substances
Road Traffic and Transport Act, 22 of 1999 and regulations GN53 of 2001	Transportation of dangerous goods
Water Act, 54 of 1956	Permitting for industrial effluents

Water Resources Management Act, 11 of 2013 (not in force yet)	Protection, development and management of water resources; licencing water abstraction, protection of groundwater, water pollution control, obstruction of watercourses, control and use of wetlands
Soil Conservation Act, 76 of 1969	Prevention of soil erosion, no regulations, not enforced
Forest Act, 12 of 2001	Protected trees, permit for mining in forested areas and cutting of trees and shrubs within 100m from river, stream or watercourse
Nature Conservation Ordinance, 4 of 1975	Protected species
National Heritage Act, 27 of 2004	Heritage site protection
MARINE LEGISLATION	
Marine Resources Act, 27 of 2000; 18.1 Regulations relating to the exploitation of marine resources, GN 241 of 7 December 2001; 18.2 Regulations relating to Namibian Islands' Marine Protected Area, GN 316 of 31 December 2012	Protection of marine habitats and animals
Marine Traffic Act 2	No abandoning of ships
Prevention and Combating of Pollution of the Sea by Oil Act, 6 of 1981	Liability, combating and prevention of oil pollution
Wreck and Salvage Act, 5 of 2004	Procedures related to salvage of ships, aircraft and life, preventing damage to marine life
Namibian Ports Authority Act 2 of 1994	Establishment of Namibian Ports Authority and management of ports and lighthouses, protection of the environment in its jurisdiction
Territorial Sea and Exclusive Economic Zone of Namibia Act 3 of 1990	Definition territorial sea and exclusive economic zone
POLICIES AND OTHER	
National Policy on Coastal Management 2012	Protect, maintain and restore health and biological diversity of ocean and coastal ecosystems
Explosives Act, 26 of 1956	Import, storage and transport of explosives
Fire Brigade Services Act, 5 of 2006 and regulations 2010	Maintenance of fire brigade services
Petroleum Products and Energy Act, 13 of 1990; 5H.1 Petroleum Products Regulations, 2000 and Notice of Application of Specifications and Standards, GN 54 of 2016	Distribution and price control
Red data lists	Plant and animals species classified as vulnerable, threatened or endangered
Oranjemund town business registration regulations, 2013	
Oranjemund town noise control	Noise control in Oranjemund town

regulations, 2013	
Electricity Act 4 of 2007	Environmental Impact Assessment for electricity installations
Electricity Regulations: Administrative, GN 13 of 16 February 2011	
Electricity Control Board: Namibian electricity safety code, GN 200 of 12 October 2011, Electricity Control Board: Namibian Electricity Safety Code, Amendment, GN 234 of 2012, technical rules, GN 47 of 2016, economic rules, GN 46 of 2016	Electricity generation licences
INTERNATIONAL CONVENTIONS AND PROTOCOLS	
Convention on Biological Diversity, 1992	Protection of biodiversity
United Nations Framework Convention on Climate Change, 1992 13.1 Kyoto Protocol, 1997	No legislation promulgated yet to meet proposed guidelines
Montreal Protocol on substances that deplete the ozone layer, 1987; Amendments 1990 and 1992, Vienna Convention for the protection of the ozone layer 1985	Prohibition of ozone depleting substances
Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat, 1971	Protection of declared wetlands
Law of the Sea Convention, 1982 (United Nations)	Territorial sea limits up to 12 nautical miles, innocent passage through territorial sea, exclusive economic zone, conservation and management of living resources, protection of marine environment
Protocol on Shared Watercourse Systems in the SADC Region	Coordinated and environmentally sound development of shared water resources, basin management committees
International Convention for the Prevention of Pollution from Ships (MARPOL 73/78)	Regulations for prevention of pollution by oil, noxious liquid substances, harmful substances, sewage and garbage
Convention on International Trade with Endangered Species (CITES)	Internationally accepted list of plant and animals species under trade restrictions

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Annex 4. Namdeb environmental policies and procedures referenced in this EMP

PR-EV-16
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