ENVIRONMENTAL
COMPLIANCE CONSULTANCY






Environmental and Social Impact Assessment Report

Walvis Bay Waterfront Properties Pty Ltd

PREPARED FOR

WALVIS BAY WATERFRONT

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Confidentiality

EXECUTIVE SUMMARY

INTRODUCTION

This Environmental and Social Impact Assessment (ESIA) report presents the findings of an ESIA undertaken for the Walvis Bay Waterfront development proposed by the proponent 'Walvis Bay Waterfront Properties Pty Ltd'. The ESIA and this report have been undertaken in accordance with the requirements of the Environmental Management Act, 2007 (Act No. 7 of 2007) and the Environmental Impact Assessment Regulation, 2007 (No. 30 of 2011) gazetted under the Environmental Management Act, (EMA), 2007 (Act No. 7 of 2007).

The proposed project is a waterfront development in Walvis Bay on the east side of the mouth of the Lagoon. It is a mixture of both marine and land-based developments. The land-based development is proposed to be developed on two adjoining plots of land to the east of popular Esplanade Drive (the road running parallel to the Lagoon). The following will be developed on-shore: two hotels; residential properties; business and conference centre; offices; restaurants; retails space; and outdoor open area. The marine development will utilise land between Esplanade Drive and the coastline (currently the Road Reserve) and will occupy an off-shore area up to and around The Raft Restaurant (Lagoon Water Area). The Marina includes an Access Channel, and Outer Marina with a breakwater and an Inner Marine made of water canals. In addition, the existing sporting facilities on the site will be relocated to two areas in Walvis Bay, these include a swimming pool, tennis and jukskei courts and cricket grounds.

ESIA PROCESS AND PUBLIC PARTICIPATION

The aim of the ESIA was to identify, predict, evaluate and mitigate the potential impacts of the construction, operation and decommissioning of the proposed project. The ESIA report presents the findings of the assessment.

The EIA methodology applied to the ESIA was developed using the International Corporation (IFC) standards and models, in particular Performance Standard 1, 'Assessment and management of environmental and social risks and impacts'; Namibian Draft Procedures and Guidance for EIA and EMP; international and national best practice; and over 25 years of combined EIA experience. The key stages of the ESIA process followed are as follows:

1. Screening: Register with the Directorate of Environmental Affairs (DEA) / Ministry of Environment and Tourism (MET), and identified if the proposed project triggers the EMA, 2007;
2. Scoping: Preparation and distribution of the Background Information Document (BID), identify the scope of the assessment and consultation with stakeholders;
3. Investigation and Baseline Studies;
4. Impact Prediction and Evaluation;
5. Draft ESIA report and Environmental and Social Management Plans (ESMP) and submit for consultation with Interested and Affected Parties (I&APs);
6. Final ESIA report, incorporating I&AP comments and submission to the DEA / MET;
7. DEA / MET Assessment and Decision; and
8. Implement Monitoring and Auditing.

Stage 1, Screening, was completed in August 2016 and Stage 2. The conclusion of Screening was that the proposed project triggered several Listed Activities in the EMA, 2007 and associated Regulations, and a detailed EIA was required.

The Scoping process was undertaken through 2017 which scoped topics to be assessed in the ESIA; identified the study area; established the availability of existing data; and defined the Terms of Reference for specialist studies. During this stage, the BID was developed and issued to I&AP for comment.

The following topics were scoped out of the assessment: soils and geology; terrestrial ecology; and surface water. A transboundary assessment, a health and safety assessment, and fault and accident assessment were also not part of the scope of assessment. The key stages of the proposed project assessed were construction and operations. Due to the uncertainties around decommissioning, this was scoped out of the ESIA, however the Decommissioning ESMP was drafted with specific requirements to be implemented prior to the project entering the decommissioning phase.

The study area for the ESIA was set at 1km from the boundary of the proposed project site for all topics, however was extended for socio-economics and the marine environment. Several data gaps were identified and as a result, surveys and studies were commissioned to fill these gaps including a Bathymetry Survey, Traffic Impact Assessment, Avifauna study, Hydrodynamic Study, Marine Mammal Study, and Sun and Height Study.

The baseline was collected in 2017 through various methods: field surveys; desktop studies; consultation with stakeholders (local authority's environmental specialists); and door-to-door engagement with neighbouring residents. During the baseline studies, experts were consulted with through face-to-face meetings, telephonic and email correspondence. The baseline focuses on environmental and social receptors most sensitive to change or receptors that have a high value of importance.

Consultation was undertaken throughout the design development of the proposed project and the ESIA process to ensure meaningful public and stakeholder participation has occurred in line with the EMA (2007) and associated regulations. Through means such as door to door knocking, postal letters, adverts, posters, public meeting, other face to face meetings, stakeholder meetings and continuous social media updates, the proposed project undertook stakeholder engagement that went over and above the requirements of the EMA (2007).

Through the stakeholder engagement process in 2017, I&APs provided feedback raising their questions, issues or concerns about the project. This feedback influenced the ESIA process and subsequently enhanced the ESIA report. Revision 1 of this ESIA report and associated appendices were formally issued to I&APs on January 15th 2018 for 21 days.

This Final ESIA Report and ESMPs has been prepared in compliance with Section 15(2) of the EIA Regulations 2012 and has been informed by I&AP comments received on the draft report. This report is submitted to DEA / MET, as the competent authority, who will make the final decision on the application for Environmental Clearance.

PROPOSED PROJECT OVERVIEW

The proposed project has been subject to a process of design evolution, informed by both consultation and an iterative environmental assessment. During design development, alternatives considered include site locations; site layout and configuration; and final design.

The proposed project will take approximately 3.5 years to construct, which will be undertaken in a phased approach: Phase 1 will be developed first followed by Phase 2, which will be market driven depending upon demand and minimising the potential economic impacts on the local housing market. Phase 2 will be constructed as soon as possible after Phase 1 to ensure the construction period is not overly extended affecting the neighbouring community.

- **Phase 1** includes the development of the Marina, residential, commercial, retail, and conference center, which is focused on the waterfront and Outer Marina.
- **Phase 2** comprises of residential, hospitality facilities and a portion of the Inner Marina (canal).

Approximately 500 jobs will be created to construct the development; between 60 – 80% of these will be from the local community. Key construction activities are as follows:

- Relocation and demolition of existing facilities;
- Construction of relocated sporting facilities;
- Sit preparation – vegetation clearance, removal of rubble and existing boundaries;
- Re-routing existing services;
- Main construction:
    - Site mobilisation and formation of the construction compound;
    - Minor earthworks including raising low-lying land (at 1.2 above Mean Sea Level) to approximately 2.6m above MSL;
    - Closure of The Esplanade and the Lagoon Promenade at the site, and provision of diversions;
    - Site office and parking located on the Namport side of the proposed project site away from residential areas as far as possible;
    - Construction material will be stored and off-loaded on the Namport side of the project site;
    - Installation of drainage infrastructure;
    - Construction of the Marina (breakwater, Outer Marina and Inner Marina);
    - Construction of buildings (residential, commercial, retail, and conference centre);
    - Construction of the Waterfront promenade, pedestrian routes and open green spaces;
    - Construction of the bridge and new Waterfront Drive;
    - Upgrades to intersections from Waterfront Drive;
    - Reinstatement and plantation of new vegetation (soft landscaping); and
    - Hard landscaping.

Various plant and equipment will be required during the construction phase, including excavators, tipper trucks, graders and compactors, tower crane, dredging and piling equipment, and smaller hand-held items. Traffic to and from the site will follow prescribed routes and scheduled times, and will be managed by banks men and signage.

Road improvements will be undertaken to ensure the conditions and capacity of the local roads can accommodate the anticipated increase in traffic volumes. These upgrades will be limited to within the existing road boundary, with the majority of works being new road markings altering junction layouts, existing roads to be upgraded to dual roads (use of road markings), and installation of traffic signals.

Phase 1 will become operational first, followed by phase 2. Walvis Bay Waterfront Properties (Pty) Ltd will be the management company for the proposed project. The day-to-day operations of the businesses will not be managed by Walvis Bay Waterfront Properties (Pty), for example the operations of a restaurant, but rather by the business owner or appointed managers. Walvis Bay Waterfront Properties (Pty) Ltd will therefore be responsible for the following:

- Care and maintenance of the marina and canal: dredging, flushing of the internal canal and regular monitoring;
- Ensuring compliance with Marina rules and regulations by all occupants (boats);
- Managing rental and levy finances for all occupants of the proposed project;
- Managing the distribution of profits;
- Undertaking regular communications with updates, news or other information to all occupants;
- Undertaking maintenance of utilities and services;
- Undertaking maintenance of open areas; and
- Managing and maintaining residential rental properties, including the serviced apartments.

Approximately 1,800 jobs will be created as a result of operating the proposed project, and further indirect jobs will be created and affect down-stream services in the Walvis Bay area.

The buildings of the proposed project are designed for a life span of 40 plus years. Before and during this time, it is envisaged that care and maintenance, refurbishment and restoration will be applied to extend the buildings life.

The Marina will accommodate berthing for approximately 70 boats. The Outer Marina and Access Channel will require dredging to maintain a safe nautical depth. This will occur approximately every five and two years respectively. The Outer Marina is expected to have a natural circulation and the Inner Marina will be a fixed water level that will be circulated.

THE RECEIVING ENVIRONMENT

Walvis Bay is the third most densely populated town in Namibia and has developed along the coastline of the Walvis Bay area due to the fishing industry and development of the Harbour, and geographical restrictions such as the Dune belt to the east and south and the Lagoon to the south-west. The key features of Walvis Bay are the main Bay area; the Harbour; the Lagoon; the Salt Works, Salt Pans and Evaporation Ponds; and the Peninsular reaching up to Pelican Point.

Walvis Bay is earmarked to become the leading industrial town in Namibia by 2030 due to its strategic location and transport networks. As a result of the current pace of economic development, including the industrial and housing sector, as well as future port expansion, the town is expected to grow substantially.

The proposed project site is located approximately 1.5km south of the town centre (the central business district (CBD)), immediately south of the Namport container terminal on the seafront at the mouth of the Lagoon. The surrounding area around the site is residential to the south, east and north-east; the majority of properties being two stories or less. Vegetation including trees lined streets in the areas. To the north of the site is the Namport container terminal, where containers are stacked around four to five containers high. To the west is the Lagoon.

The key receiving environmental and social features in the study area are the Lagoon, including the water quality and ecology; the Ramsar site and local avian community; marine mammals; local businesses; local residents and community; and the tourism industry.

Local businesses in the area surrounding the site (500m from the site boundary) for the proposed project include: the Protea Pelican Bay Hotel; Various restaurants including Anchors Restaurant, the Boardwalk, Lyon Des Sables Restaurant, Brume sur le port, The Venue and View Café; The Raft Resturant; Various privately owned local Guest Houses and hotels, including the Oyster Box, Langholm hotel, the Courtyard and Loubser's B&B; The Walvis Bay Yacht Club; Walvis Bay Salt Holdings operates the Saltworks; informal vendors and various tourism service providers.

Residents surrounding the project site currently have views of an open green space with low-level buildings. Some properties have views of the Lagoon. The landscape character is mixed between residential and industrial due to the Namport container terminal to the north. The Seascape character is dominated by the Protea hotel and the Raft Restaurant, residential properties lining the Lagoon waterfront and the Namport South Port in the Harbour area. The mudflats can be seen from the coast on clear days.

The Lagoon is a dominating feature of Walvis Bay, and plays a fundamental feature of the Ramsar site. It is the source of water that supplies the Salt Pans and provides an environment suitable for roosting and feeding for a significant proportion of the birds in the Bay area. It is also used for recreational activities such as kayaking. The attributes that make up and influence the Lagoon's environment are the wind and currents; tides and waves; water flow; sedimentation and turbidity; temperature and salinity; and decomposition of organic material.

The nutrient-rich waters of the Benguela system provides food for phyto- and zooplankton in the Bay area, which leads to high biological production and large numbers of pelagic fish such as pilchard, anchovy and juvenile horse mackerel, which in turn sustain an abundance of top predators such as whales, dolphins, shark, turtle and seabirds. The soft-bottom fauna (benthic fauna) is abundant (however species poor) and also provides food for the bird and fish populations.

Marine mammals such as Cape-fur seals, various species of whales and dolphins, including the Common, Dusky and Bottlenose Dolphins and the endemic Heavyside's Dolphin are found in the Bay waters. The Bottle-nosed Dolphins and whales are observed around the Peninsula and frequently enter the Lagoon. A large proportion of the Bottlenose population uses the shallow waters of the Lagoon for feeding, socializing and resting on a regular basis.

Walvis Bay holds the largest number of birds than any other wetland in southern Africa, which is predominantly dominated by wading birds. The number of wading birds are highest in the austral summer when all the migrant waders congregate at the coastal wetlands. The winter numbers reflect, mainly, the resident species with a few over-wintering sub adult migrants that do not need to head back to the northern hemisphere. In the Lagoon wading birds, rather than seabirds, predominate (40% of the waders in the area), and approximately 20 bird species regularly occur in numbers greater than 1% of the world's population.

IMPACT ASSESSMENT FINDINGS

Once the baseline was collected, the assessment of impacts commenced. Through the ESIA, a range of potential environmental and social impacts were identified. The ESIA report presents those that are considered as significant or sensitive to the community.

The Raft restaurant will likely be affected the most during the construction works due to the indirect impacts that will affect patrons visiting the restaurant. The construction of the Marina, in particular the breakwater wall will cause noisy and visually intrusive activities next to the restaurant. These impacts will most likely deter patrons from visiting the restaurant, but also affect their visit thereby reducing their stay. Mitigation measures such as a visual screen and technologies have been identified to minimise noise during construction works, however a reduction in revenue could occur during this time. Further engagement with the owners of the Raft Restaurant will continue to identify further mitigation measures or agreements to reduce the level of significance.

During construction, there is potential that tourists and the local community will not use the surrounding local businesses due to disruption and other construction impacts (e.g. noise, increase traffic and thus traffic disruption, and dust). This could result in a loss of revenue to some businesses. This impact however, would be for a short duration during the construction phase, and in the operational phase, local businesses are likely to see an increase in revenue due to an increase in number of people frequenting the area.

A small section of Esplanade road will be permanently closed; however, this is unlikely to impact users as it is the end section of the road and alternative access routes are available. A new road through the proposed project site, Waterfront Drive, will also be developed. Pedestrian access routes will be integrated into the proposed project, allowing access up to the Protea Hotel, and potentially through to the existing waterfront.

The relocation of the sporting facilities will leave the local community without facilities for a short duration of time. However, these facilities will be replaced on a like for like basis elsewhere in the town, will be brand new and modern; an improvement from the existing facilities. A large open green space will be lost through the development of the proposed project, however open spaces have been integrated into the design of the proposed project, and alternative green spaces are available within 2km of the site.

There will likely be adverse impacts on the local residents as a result of construction activities. An increase in noise levels will occur, dust may arise, and there will be a presence of construction traffic. Even with appropriate mitigation, these impacts are likely to be the most cause of concern for local residents, and therefore appropriate community engagement will be undertaken for the duration of the construction works.

The presence of the proposed project would result in a change to the amenity, sense of place, and seascape and landscape characters of the area. Over time, local residents will become accustomed to the new environment, however some may not. The design of the proposed project has taken into consideration a range of factors to ensure the development integrates into the local environment, minimising environmental and social impacts.

Another major concern, as expressed by many I&APs, is the potential impacts on the Lagoon and Ramsar site. Dedicated studies were undertaken, and the overall conclusions are that the proposed project may result in some short term adverse impacts such as suspended solids, however this will not alter the integrity of the Ramsar site or the Lagoon's ecosystems, including the bird life. An increase in small recreational boats will occur, thereby increasing the potential risk of pollution and waste entering the marine environment and potentially disturb marine wild life; however strict marina rules and controls, and access to the Lagoon will not be allowed.

Marine mammals, in particular dolphins may be affected by the construction works and maintenance dredging through increased suspended solids, noise and vibration and impacts on their food sources. It is likely that they will avoid the areas during these short periods and will return due to the protection the Bay and Lagoon provides, and the available food sources. All construction works in the marine environment will be overseen by suitably qualified personnel to ensure marine mammals are not impacted.

Both the construction and operational phase will create jobs, resulting in various beneficial impacts such as an increase in local economic activity, reduction in unemployment and increase in skills and training. House prices are expected to increase as a result of the presence of the proposed project and new bulk infrastructure will be provided, thereby improving the local sewerage and freshwater supply systems.

A summary of the environmental and social impacts, after mitigation, associated with the construction, and operation of the proposed project is presented in Table 1. These impacts are considered to be of significance or sensitive issues to the community.

Continual engagement will be undertaken with the community through the construction and operations of the proposed project. Through feedback and where possible, additional measures may be identified to reduce these impacts.

CUMULATIVE IMPACT ASSESSMENT FINDINGS

A CIA was undertaken to identify intra-project and inter-project impacts:

- **Intra-project cumulative impacts:** Cumulative impacts that occur within the proposed project;
- **Inter-project cumulative impacts:** Cumulative impacts that occur as a result of the proposed project in combination with other projects, which is split into two:
    - Cumulative impacts with existing projects; and
    - Cumulative impacts with future projects.

The CIA considered past, present and realistically defined future projects, which were identified through a desk-based investigation.

INTRA-PROJECT CUMULATIVE IMPACT ASSESSMENT CONCLUSIONS

The findings of the assessment of combined impacts and activities within the proposed project (intra-project cumulative impacts) found that the following receptors are likely to have moderate or major impacts:

- **The Raft Restaurant:** Potential loss of revenue;
- **Local residents and community**: Severance, increased noise and dust, change of residential views and local landscape/seascape character, change to sense of place, and temporary loss of sporting facilities.
- **The Ramsar Site:** Reduced water quality (increased sedimentation), reduced marine flora, changes to bird habitat, reduced food for birds and disturbance to birds (please note that the proposed project is not the responsible development for these potential impacts as discussed in the CIA above); and

- **Marine Mammals:** Potential loss of food source, marine noise levels, other disturbance and human-wild life interaction leading to mammals avoiding the area.

A precautionary assessment approach has been applied; therefore, with the application of best practice and additional mitigation measures, the predicted impacts may be less severe. Key mitigation will be the sequencing and scheduling of construction activities; type of dredging and piling techniques applied; dredging on the outgoing tide, applying soft starts to machinery and equipment; applying dust suppression techniques; and implementing traffic management and calming measures. In addition, a range of monitoring will be undertaken including but not limited to, water quality and noise monitoring.

INTER-PROJECT (EXISTING) CUMULATIVE IMPACT ASSESSMENT CONCLUSIONS

Existing projects and activities that continue to affect shared environmental and social receptors with the proposed project are the Salt Works and associated evaporation ponds; fish factories; diversion weir on the Kuiseb river; Phase 1 of Namport's Container Expansion project; and tourism. The shared environmental and social receptors which are continually being influenced by anthropogenic influences and natural processes, and thus resulting in adverse changes, are the Lagoon's water quality and sedimentation rates, marine flora and fauna, the avian community, and the Ramsar site.

Whilst the proposed project could potentially contribute to the continual adverse changes of each of these receptors through various activities, the contribution is considered to be insignificant, and thus it is unlikely that the proposed project will be the responsible development for the incremental impacts.

INTER-PROJECT (FUTURE) CUMULATIVE IMPACT ASSESSMENT CONCLUSIONS

Through a desk-based review, six future projects were identified that could potentially have an impact on shared environmental or social receptors with the proposed project:

a) Walvis Bay South Port Terminal: Phase 1 of the Namport's Container Expansion project becoming operational;

b) Walvis Bay South Port Terminal: Construction and operation of both phases 2 and 3 of the Namport's Container Expansion project;

c) Namport's Waterfront and Marina;

d) Walvis Bay North Port Terminal;

e) Development of a hotel and casino on erven 4941; and

f) Lovers Hill development.

The following activities were identified that could potentially have an impact on shared environmental or social receptors as the proposed project: Increased population as well as tourists and visitors to the Walvis Bay area; and Increase in activities within the marine environment (tours, recreational boat users, sporting activities and fishing).

Projects c – f were not considered as realistically defined projects in accordance with IFC assessment guidance. A high level qualitative CIA was therefore undertaken which considered these projects in combination with the proposed project. Shared receptors that could potentially be impacted, and thus result in cumulative impacts are the community and the Ramsar site. Local residents surrounding the proposed project site could potentially be impacted by increased traffic volumes, increase in noise levels and a change to the local landscape. The features and attributes of the Ramsar site including the Lagoon environment (a fundamental component), could be impacted from various activities which could alter the water quality and avian life.

The magnitude of change, and nature and severity of impacts caused by the construction and operations of these four projects will determine the level of significance of the cumulative impacts on these receptors. This information is currently unknown; therefore, significance cannot be determined or suitable mitigation.

Phase 1 of the Namport's Container Expansion project is 76% complete and is expected to become operational in 2019. Phases 2 and 3 are unlikely to be constructed before 2025. An EIA was undertaken for the Namport Container Expansion project, and an Environmental Clearance was issued, therefore the Namport project is considered as a realistically defined project. The operations of phase 1, and construction and operations of phases 2 and 3 were assessed in the inter-project CIA.

The inter-project CIA illustrates that the proposed project would likely be responsible for the following incremental impacts that would occur in addition to the Namport project:

- Avian community impacted from noise during operations: Minor cumulative impact;
- Local residents surrounding the proposed project site impacted through increased noise levels: Moderate cumulative impact; and
- Local residents surrounding the proposed project site impacted from change to local views and changes to landscape and seascape character: Moderate cumulative impact.

The increase in noise levels to residents surrounding the proposed project site would be felt during normal working hours which would be generated from Namport traffic, traffic to and from the proposed project (users of the development and staff) and a slight increase from operational activities on the proposed project site (day to day operations). These cumulative impacts are localised and various mitigation measures are in place to manage noise levels, such as designated routes to and from the proposed project site and restricted operating schedule. The proponent will continually monitor the changes to the baseline and there will be an Environmental and Sustainability Manager in place to manage concerns and potentially identify further controls where issues arise.

Walvis Bay has a dynamic environment which is constantly changing. Views, landscape and seascape character and sense of place will continue to change, and people will adapt to these changes. The impacts to local residents are expected to reduce over time as people will be accustomed to the changes to their surroundings.

In addition to the above, it is concluded that the proposed project does not jeopardise the sustainability or integrity of the Lagoon environment and Ramsar site; the potential impacts arising from the proposed project are insignificant compared to other project and activities. It is acknowledged that the Lagoon environment is changing and could further be affected by other projects, therefore further collaborative work needs to be undertaken to ensure the Lagoon is protected holistically due to its value.

The conclusions drawn from the CIA demonstrates that the proposed project may contribute to cumulative impacts, and in particular will result in localised cumulative impacts to receptors adjacent to the proposed project site. In a wider context, both temporally and spatially, the proposed project is unlikely to be the responsible development for significant incremental impacts, as the degree of this contribution to those impacts is considered to be marginal compared to other developments and activities in the area. It should be noted, that the wider cumulative impacts (not local) are expected to occur with or without the development of the proposed project.

RECOMMENDATIONS

Whilst undertaking this ESIA, various observations have been made, and as responsible environmental practitioners and proponent, recommendations have been proposed. These recommendations do not in any way have a bearing on or alter the findings of this ESIA; some may confirm findings or are required as part of the monitoring and management arrangements through the construction and operational phase. The main purpose of these are to

illustrate there are environmental and social concerns that are bigger than this project and improvements can be made.

1. **Namibian Town and Regional Development Plans and CIA**

During the review of the Walvis Bay IUSDF, it was recognised there was an opportunity to improve the way in which development plans such as the IUSDF, are prepared. This improvement could include the provision for a comprehensive SEA with a supporting CIA for large-scale development plans in future. This will ensure cumulative impacts on potentially sensitive receptors are understood and determined at a strategic level and not reliant on being assessed on a project-by-project basis.

It is therefore recommended that Strategic CIAs be undertaken in future, for all strategic development plans and when revisions of development plans occur to ensure the environment and social cumulative impacts are understood and considered in the National and Regional development framework and plans.

The IFC assessment guidance which is part of the World Bank states that it is the Government and regional planners that have the ultimate responsibility of this level of CIA.

It is also recommended that any future developments (planned or unplanned in the IUSDF) in Walvis Bay undertake a robust CIA as part of their EIA (similar to that applied and conducted for this CIA in line with IFC standards).

2. **CIA for the Ramsar site**

The draft Wetland Policy for Namibia sets out the threats to Namibia's wetlands, presents goals and objectives, and details the need for partnerships and co-operation for the management and protection of Namibia's wetlands. The SEA for the Coastal area of Erongo and Kunene Regions also recognises there is a weak structure for the protection of Namibia's wetlands. One of the recommendation in this report was: *'MET, the Walvis Bay Municipality and the Coastal Environmental Trust of Namibia should as soon as possible establish a long-term environmental monitoring programme including the biodiversity elements for terrestrial, coastal as well as offshore habitats found in the wetland. A baseline for the monitoring programme should produce diversity gradients in relation to tourism, aquaculture and agriculture and the acquired data should feed into the requirement for improved Environmental Impact Assessments.'*

As part of the above commitments i**t is recommended that a detailed CIA should be undertaken to support the policy and management plans.** The purpose of undertaking a CIA would not only meet the policy goals and objectives, it would take the extra step of defining environmental quality objectives and thresholds for various attributes of the Ramsar site. This will be used to inform the parameters of future development and steer development that interacts with the Ramsar site in a sustainable direction.

ECC recommends that this is completed prior to any future development which is likely to cause significant effects on the Lagoon or other features of Ramsar site (please note, this project is not likely to cause any significant effects on the marine environment, and a detailed CIA has been completed for the project in this report). Therefore, this recommendation should not alter the ability for the regulating authority to issue an environmental clearance certificate for the proposed project. This recommendation is made solely on the basis of improving future EIAs that might not be completed with the same level of attention and assessment that has been applied to this ESIA.

3. **Namport Container Expansion project EIA**

It is recommended that prior to the second and third phases of the Namport project progressing, additional work to strengthen their existing EIA should be undertaken. This should include a robust and detailed CIA. Furthermore, construction of phases 2 and 3 should be dependent on ability to demonstrate compliance with conditions set for Phase 1. This recommendation is made on the basis that the consultant, the proponent and many of the I&AP for this

project expressed concern for the lagoon as a result of the Namport construction project. It is apparent that further work is required to address these concerns.

4. **Environmental monitoring**

In relation to the above recommendations, **it is recommended that collaborative environmental monitoring between the Municipality, Namport, the proposed project proponent and other key stakeholders and developers should be undertaken.**

FINAL REMARKS

Based on the findings of the specialist studies and taking into consideration the overall potential adverse impacts, mitigation measures and the potential beneficial impacts, ECC believes the long-term benefits of the proposed project outweigh the short-term adverse impacts. In addition, the proposed project will contribute to the sustainable development of Walvis Bay, in line with the Walvis Bay IUSDF and National Development Plans.

The implementation of the ESMPs and associated programme of environmental protection as an outcome of the impact assessment process would serve to minimise the impacts and risks associated with the proposed project to an environmental and socially acceptable standard. **An Environmental Clearance Certificate could be issued, on condition that the management and mitigation measures in the ESMP are adhered to.**

1 CONTENTS

TABLES

FIGURES

DEFINITIONS AND ABBREVIATIONS

Acronym	Term
ALARP	as low as reasonable practicable
BCLME	Benguela Current Large Marine Ecosystem
BCC	Benguela Current Convention
BID	Background Information Document
CBD	central business district
CIA	Cumulative Impact Assessment
dB(A)	Unit of Measure
ECC	Environmental Compliance Consultancy
DEA	Directorate of Environmental Affairs
EIA	Environmental Impact Assessment
EPZ	Export Processing Zone
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GDP	Gross Domestic Product
I&APs	Interested and Affected Party
IPPC	Intergovernmental Panel on Climate Change
IUSDF	Integrated Urban Spatial Development Framework
LAT	Lowest Astronomical Tide
MAWF	Ministry of Agriculture, Water and Forestry
MET	Ministry of Environment and Tourism
MFMR	Ministry of Fisheries and Marine Resources
MSL	Mean Sea Level
NDP	National Development Plan
NGOs	Non-Governmental Organisations
NMPCP	National Marine Pollution Contingency Plan
Ramsar	Ramsar Convention
RFFPs	Reasonable foreseeable future projects
SADC	Southern African Development Community
SEA	Strategic Environmental Assessment
SME	Small Medium Enterprises
SWMP	Site Waste Management Plan
UNAM	University of Namibia
WBWF	Walvis Bay Waterfront Properties (Pty) Ltd

1 INTRODUCTION

1.1 PURPOSE OF THIS REPORT

This Environmental and Social Impact Assessment (ESIA) report presents the findings of an ESIA undertaken for the Walvis Bay Waterfront development proposed by the proponent 'Walvis Bay Waterfront Properties Pty Ltd'. This document has been prepared by Environmental Compliance Consultancy (ECC).

ECC's terms of reference for this assessment (see Appendix C) was to strictly address potential environmental and social impacts, whether positive or negative, and their relative significance, and explore alternatives for technical recommendations and identify appropriate mitigation measures for the Walvis Bay Waterfront development.

The ESIA and this report have been undertaken in accordance with the requirements of the Environmental Management Act, 2007 (Act No. 7 of 2007) and the Environmental Impact Assessment Regulation, 2007 (No. 30 of 2011) gazetted under the Environmental Management Act, (EMA), 2007 (Act No. 7 of 2007) (referred to herein as the EIA Regulations).

This ESIA report and appendices including the Environmental and Social Management Plans (ESMP) (Appendix A) are being submitted to the Directorate of Environmental Affairs (DEA) at the Ministry of Environment and Tourism (MET) for review as part of the Environmental Clearance Certificate application and support the decision-making process for the Walvis Bay Waterfront development proposal. The ESIA report and appendices are also being submitted to the Ramsar Convention, MET Conservation division responsible for the Ramsar site, Ministry of Fisheries and Marine Resources, Ministry of Works and Transport and project stakeholders who were consulted with during the ESIA process.

This ESIA report and associated appendices were submitted to the relevant competent authorities, MET and Interested and Affected Parties (I&APs) on Monday 15th January 2018 for public and stakeholder comment. Comments have been considered and incorporated into this ESIA report where they were deemed to be material to the decision-making or enhanced the ESIA and ESIA report. An Addendum report and associated appendices will accompany this ESIA report. The addendum collates all comments received during the I&AP public review period and provides responses from the proponent and ECC for all comments.

1.2 PROPOSED PROJECT

Walvis Bay is a coastal town located in the centre of the Namibian coastline and is home to Namibia's largest commercial port. Over the last decade, Walvis Bay has developed considerably as a result of urbanisation, the tourism industry and the operations of Walvis Bay Harbour. The town is a key tourist destination due to the diverse populations of birds and marine wildlife. The tourism industry and the town's population are expected to double by 2030 (see Chapter 6 for more detail) infrastructure to support this growth is therefore required.

The Walvis Bay Waterfront project (referred to herein as the proposed project) is located on the east side of the mouth of the Lagoon, at the far west end of the town, south of the container terminal (see Figure 1). The proposed project is a mixture of both marine and land-based developments. The land-based development is proposed to be developed on two adjoining plots of land to the east of popular Esplanade Drive (the road running parallel to the Lagoon). This development will include two hotels; residential properties; business and conference centre; offices; restaurants; retails space; and out door open area. The marine development will utilise land between Esplanade Drive and the coastline (currently the Road Reserve) and will occupy an off-shore area up to and around The Raft Restaurant (Lagoon Water Area). The Marina includes an Access Channel, and Outer Marina with a breakwater and an Inner Marine made of water canals. In addition, the existing sporting facilities on the site will be relocated to two areas in

Walvis Bay, these include a swimming pool, tennis and jukskei courts and cricket grounds, as illustrated in Figure 6.

The project aims to maintain Walvis Bay's dominant maritime identity, while simultaneously strengthening the city's character with various urban elements. The main focal point and features of the proposed project is the marina and canal. The marina will cater for the mooring of recreational boats and leisure yachts, and provide an open outdoor feature for tourists and local community.

The proposed project was developed through an analysis of the city's history, structure, character, potentials and challenges in response to the area's development as a new residential and commercial hub with a functional marina. It will create a community and tourism asset that will drive economic development in Walvis Bay and the Erongo Region and will support the town becoming one of the top tourist destinations in Namibia. The development will transform the landscape from its current municipal land into a positive living prescient, capturing the unique character and charm of Walvis Bay. Chapter 4 provides the full description of the proposed project.

Figure 1 - Proposed project site locations [Source: Google Earth, 2018]

1.3 PHILOSOPHY AND BENEFITS OF THE PROPOSED PROJECT

The proposed project is being developed to become the 'people's waterfront'. The aim of which is to support and facilitate the growth of the local community and economy, and provide facilities, which strengthen community relationships.

The proposed project aims to:

- Establish a world-class waterfront and create a tourism node for Walvis Bay;
- Uplift the currently underutilised municipal land;
- Generate revenue and economic stimulus to the business and tourism industries of Walvis Bay; and
- Provide a multi-purpose, recreational and lifestyle facility for all community members of Walvis Bay, the broader Namibian community, international and domestic tourists.

The project will generate a range of social and commercial benefits, which include but are not limited to the following:

- Providing residential properties which form part of the strategic plan for the management of an increasing population;
- Providing tourism facilities which will attract and retain tourists in Walvis Bay thereby supporting economic growth through increased bed occupancy and additional spending;
- Relocating existing sporting facilities to lower income areas thereby improving the availability of facilities for the less affluent areas;
- Improving local bulk services including water supply, sewerage treatment and electricity;
- Encouraging and supporting local investment;
- Creating direct and indirect employment opportunities;
- Increasing demand for secondary services such as catering and cleaning, thereby providing additional employment opportunities; and
- Increasing property values.

The philosophy and benefits of the proposed project align to the National Policy on Tourism principals (Directorate of Tourism, 2008) by providing an economical, social and environmentally sustainable tourism development, the yields long-term benefits

1.4 NEED AND DESIRABILITY OF THE PROPOSED PROJECT

A market study for the Walvis Bay Waterfront Mixed-use Development was commissioned and used to guide the design and composition mix of the development. The findings of this study were separated into four key pillars: residential; office; retail; and hotel. The study analysed the geographical influence of the proposed project, including undertaking a detailed assessment of the background demographics of Namibia, drawing down to the study area of Walvis Bay.

A site evaluation was also conducted, including the site profile, and an evaluation model applied. A Strength, Weakness Opportunity and Threat (SWOT) analysis and an evaluation summary were conducted for each pillar; the key findings per pillar to support the market capability, need and capacity for the proposed project, is set as follows:

RESIDENTIAL

- The Walvis Bay Waterfront propose to construct luxury and ultra-luxury apartments; the study found that there is

scope for such residential units but should be phased to not saturate the market. The project has applied the planned the phased approach to the development

- According to market and realtor interviews, there appears to be a high demand for luxury apartments, depending on the location of such developments that is likely to drive the asking price.

OFFICE

- Office demand was assessed and it was determined that the development would require an average market share of 5% from the net effective demand. The study determined that the development would be able to achieve this market share due to the unique position and ability to provide A Grade offices in a prime location
- The majority of businesses are anticipated to be located in Walvis Bay that should make it less difficult to fill the office space with tenants.
- From the site evaluation, the office component rated 70%. The site has the ability to establish a new node and bring tenants closer to the hotel occupants that could make use of services such as tour guides and operators that currently depart from the existing waterfront across the road.

RETAIL

- The retail pillar of the market demand survey found international and local tourism markets as key contributors to income in the region and Walvis Bay.
- A strong market demand for retail was determined in the study; however, it concluded that a selective market strategy be applied to avoid duplication of the existing retail chains as seen in Walvis Bay and Swakopmund. The project aims to engage local and boutique retail and this strategy has been applied in the design of the development.
- There is, however, a difference between the local convenience retail market and the retail orientated towards the tourism market, which is currently more concentrated in Swakopmund. Tourism retail has a much more affluent feel to it and consists of jewellery stores, restaurants, boutique fashion and curious shops.

HOTEL

- The hotel pillar of the study concluded that the demand for hotel beds in Walvis Bay is primarily driven by international holidays and business.
- The two main tourist destinations within the Erongo Region is Walvis Bay and Swakopmund which receive 25% and 30% of all tourism inflow to the region respectively.
- The study area shows, 85% of the mapped accommodation facilities are situated in Swakopmund while Walvis Bay only represented 9% of the supply.

As per the National Policy on Tourism principals (Directorate of Tourism, 2008), the proposed project is market-driven. An assessment of the market potential and viability has been undertaken and used to guide the investment and design of the Walvis Bay Waterfront. The feasibility and bankability of the project have been determined by market demand and is in line with investor due-diligence.

1.5 THE PROPONENT OF THE PROPOSED PROJECT

The proponent of the project is Walvis Bay Waterfront Properties (Pty) Ltd, a registered Namibian company (number: 2013/1138). Walvis Bay Waterfront Properties (Pty) Ltd (referred to herein as the proponent) is a joint venture between Afrikuumba (a Namibian registered company) and the Municipality of Walvis Bay. The Company is engaged in all activities relating to the development of the proposed project, including site preparation, construction and operations.

Table 1 - Proponent

Proponent Representative	Proponent Representative
Mr Titus Nakuumba Afrikuumba Partner P O Box 90885 Windhoek, Namibia Tel: + 264 61 400177 Email: titusn@afrikuumba.com.na	Mr Victor Agostinho Walvis Bay Municipality Partner P O Box 90885 Windhoek, Namibia Tel: + 264 61 400177 Email: avictor@walvisbaycc.org.na

1.6 ENVIRONMENTAL CONSULTANCY

ECC, a Namibian consultancy (registration number Close Corporation 2013/11401), has undertaken the ESIA and prepared this report on behalf of the proponent. ECC operates exclusively in the environmental, social, health and safety fields for clients across Southern Africa, in both the public and private sectors. ECC is independent to the proponent and has no vested or financial interested in the proposed project.

All compliance and regulatory requirements regarding this ESIA report should be forwarded by email or post to the following address:

Consultant:
Environmental Compliance Consultancy
PO BOX 91193
Klein Windhoek, Namibia
Tel: +264 81 262 7872 or Tel: +264 81 653 1214
Email: info@eccenvironmental.com

The individuals who contributed to the ESIA and this report are provided in Table 2.

Table 2 - ESIA Project Team

Name	Role
Mr Stephanus Bezuidenhout (ECC)	Environmental Practitioner and Consultant ESIA Project Core Team
Ms Jessica Mooney (ECC)	Environmental Practitioner and Consultant ESIA Project Core Team
Ms Rachel Moore	Environmental Practitioner and Consultant ESIA Project Core Team
Dr Amanda Rau	Palaeoceanography and Marine Geologist - Marine Mammals Impact Assessment
Dr Rob Simmons	Ornithologist - Avian Impact Assessment

Name	Role
Dr Hendrik Bergmann	Marine Consultant Senior Coastal Engineer - Hydrodynamic Modelling and Water Exchange Assessment
Mr Hugo Engelbrecht	Traffic Engineer - Traffic Impact Assessment
Dr Peter Tarr (SAIEA)	Independent Peer Reviewer – ESIA Report

1.7 Environmental Requirements

1.7.1. Environmental and Social Impact Assessment

The Environmental Management Act, 2007 stipulates that an Environmental Clearance Certificate is required to undertake Listed Activities under the Act and associated Regulations. Listed activities triggered by the proposed project in accordance with the Environmental Management Act, 2007 and supporting regulations are listed below:

WASTE MANAGEMENT, TREATMENT, HANDLING AND DISPOSAL ACTIVITIES

- 2.3 The import, processing, use and recycling, temporary storage, transit or export of waste;
  - Temporary storage of waste generated by operations of the proposed Waterfront.

LAND USE AND DEVELOPMENT ACTIVITIES

- 5.1(d) The rezoning of land from open space to any other use;
  - The rezoning of erven 4941 and 4939.

TOURISM DEVELOPMENT ACTIVITIES

- 6 The construction of resorts, lodges, hotels or other tourism and hospitality facilities;
  - Construction of two hotels, several restaurants and conference facilities.

WATER RESOURCES DEVELOPMENTS

- 8.10 Reclamation of land from below or above the high-water mark of the sea or associated inland waters;
  - Construction of a marina and other structures below the high-water mark.
- 8.11 Alteration of natural wetland systems;
  - Marina breakwater and retaining wall extending into the Lagoon connecting to the Raft Restaurant.

HAZARDOUS SUBSTANCE TREATMENT, HANDLING AND STORAGE

- 9.1 The manufacturing, storage, handling or processing of a hazardous substance defined in the Hazardous Substances Ordinance, 1974;
  - Temporary storage of diesel during construction.
- 9.2 The storage and handling of a dangerous goods, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic meters at any one location;
  - Temporary storage of diesel during construction (Two 22,000 litre tanks bunded to contain a capacity of 110% of the stored volume);
  - Diesel tanks in standby electricity generators.

INFRASTRUCTURE

- 10.1(a) The construction of bulk supply pipelines;
  - Re-routing of the existing sewerage pipelines.
- 10.1 (e) The construction of any structure below the high-water mark of the sea;
  - The foundations of the marina wall will be constructed below the high-water mark.

OTHER ACTIVITIES

- 11.2 Construction of cemeteries, camping, leisure and recreational sites;
    - Construction of two hotels and relocation / construction of recreation and leisure facilities.

As part of the Environmental Clearance Certificate application, an ESIA has been undertaken to satisfy the requirements of the Environmental Management Act, 2007. This report addresses the requirements and provisions stipulated in the EIA Regulations and presents the findings of comprehensive studies of the existing environment and the potential impacts to the physical and social environments as a result of the proposed project.

1.7.2. Environmental and Social Management Plan

In addition to the ESIA, an ESMP is also required under the Environmental Management Act, 2007. A suite of ESMPs have been developed to provide a management framework for the planning and implementation of construction activities and provides construction standards and operating arrangements so that potential environmental and social impacts of the proposed project are mitigated, prevented and minimised as far as reasonable practicable, and that statutory requirements and other legal obligations are fulfilled.

The ESMPs for the proposed project is a series of three documents, one for each phase of the project:

- Site Preparation and Construction ESMP
- Operations ESMP Operations ESMP
- Decommissioning and Reinstatement ESMP

By having individual ESMPs specific to phases, the application of the plan and the management of environmental risks shall be more effective and easier to implement. All three are contained in Appendix A.

1.8 Objectives of this ESIA Report

This ESIA report has been prepared to present the finding of the ESIA and provide information to Authorities, the public, I&APs and stakeholders to aid in the decision-making process for the proposed project. The main objectives of this ESIA report are therefore:

- To define the scope of the proposed project and the potential interaction of the project activities with the natural and social environment;
- To review, identify and apply applicable national and international legislation, standards and guidelines during the ESIA;
- To provide a description of the receiving environment;
- To provide a description of the proposed project from site preparation to final design and restoration;
- To identify and assess potential environmental and social impacts from the proposed project;
- Identify and describe mitigation measures to prevent, minimise and/or abate/treat the identified potential environmental and social impacts;
- To provide a means by which the mitigation measures will be implemented, and residual impacts managed; through the provisions of an ESMP; and
- To facilitate public consultation throughout the assessment and development of the proposed project.

1.9 REPORT STRUCTURE

The ESIA report is structured as per the contents set out in table 3.

Table 3 - ESIA Report Structure

SECTION	TITLE	CONTENT
-	Executive Summary	Executive summary of the ESIA
-	Acronyms	A list of acronyms used throughout the report
1	Introduction	This chapter introduces the ESIA and provides background information on the proponent
2	Regulatory Framework	This chapter describes the Namibian, international and relevant environmental regulatory framework applicable to the project
3	Approach to the ESIA	Provides the approached undertaken and applied to the ESIA
4	Project Description	Technical description of the project
5	Alternatives & Design Evolution	This chapter considers alterative options for the project that allow the objectives of the project to be met detailing the reasons for the selection and rejection of options
6	Description of the baseline environment	This chapter describes the existing environment through the analysis of the baseline data regarding the existing natural and socio-economic environment
7	Prediction and Evaluation of Impacts Methodology	This chapter presents the methodology applied to the ESIA
8	Assessment Findings and Mitigation	This chapter predicts the potential environmental and social impacts arising from the project, the assessment of impacts including residual impacts This chapter also outlines the proposed management strategies for monitoring commitments to ensure the actual and potential impacts on the environment are minimised to as low as reasonable practicable (ALARP) this informs the ESMP
9	Stakeholder Engagement and Consultation	This chapter outlines the process and details, associated with public participation for the ESIA Questions, issues or concerns raised by stakeholders are tabulated in this Chapter, along with the location of where these questions, issues and concerns are addressed in this ESIA report.
10	Conclusions	Summarises the findings of the ESIA and provides recommendations.
11	References	A list of reference used for this report

The ESIA report has the following supporting appendices:

A Environmental and Social Management Plans
B MET Project Notification
C MET Scope of Assessment
D Stakeholder Engagement Evidence
E Background Information Document
F Bathymetric Survey
G Traffic Impact Assessment
H Avian Impact Assessment

I Hydrodynamic Impact Assessment Study
J Marine Mammal Impact Assessment
K Sun & Height Study
L Method Statement for Sewer Relay
M CVs for ECC Team
N Watermaster Environment Dredger fact sheet

OTHER:

- ADDENDUM 1

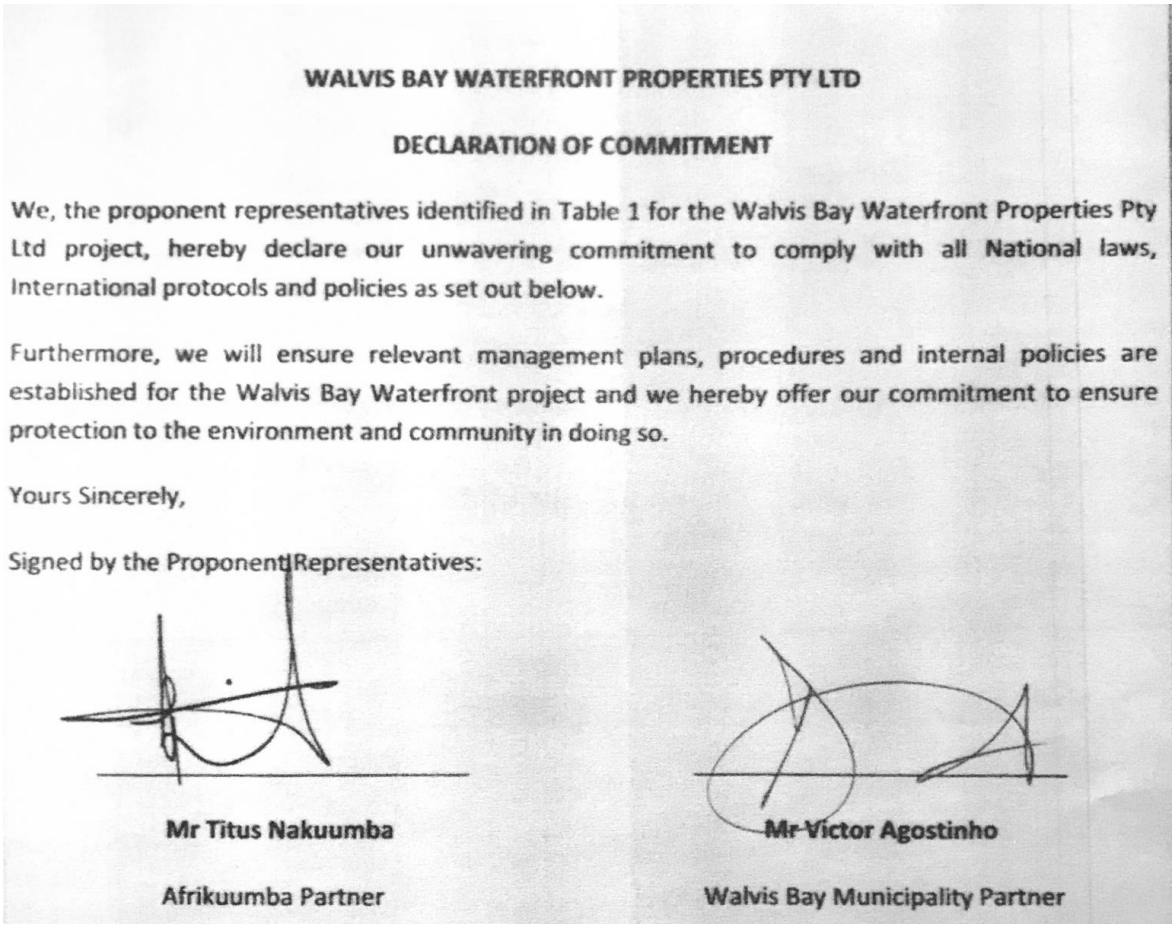
2 REGULATORY FRAMEWORK

2.1. INTRODUCTION AND PROPONENT DECLARATION OF COMMITMENT

The Constitution of the Republic of Namibia, 1990 clearly defines the Country's position in relation to sustainable development and environmental management. The Constitution refers that the State shall actively promote and maintain the welfare of the people by adopting policies aimed at the following:

"Maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future; in particular, the Government shall provide measures against the dumping or recycling of foreign nuclear and toxic waste on Namibian territory." ***The Constitution of the Republic of Namibia Article 95 (l)***

This section of the report outlines the regulatory framework applicable to the proposed project. The proponent holds their responsibilities and commitments made in line with this framework in the highest regard and provides this statement of commitment to comply with the provisions of the regulatory framework set out below.



WALVIS BAY WATERFRONT PROPERTIES PTY LTD

DECLARATION OF COMMITMENT

We, the proponent representatives identified in Table 1 for the Walvis Bay Waterfront Properties Pty Ltd project, hereby declare our unwavering commitment to comply with all National laws, International protocols and policies as set out below.

Furthermore, we will ensure relevant management plans, procedures and internal policies are established for the Walvis Bay Waterfront project and we hereby offer our commitment to ensure protection to the environment and community in doing so.

Yours Sincerely,

Signed by the Proponent Representatives:

Mr Titus Nakuumba

Afrikuumba Partner

Mr Victor Agostinho

Walvis Bay Municipality Partner

Figure 2 Walvis Bay Waterfront Properties PTY LTD Declaration of Commitment

2.2. INTERNATIONAL CONVENTIONS & AGREEMENTS

International conventions relevant to the proposed project (have to be complied with or have influenced the design) or relate to the scope of the ESIA (have influenced or have been considered in the ESIA process) are summarised in Table 4.

Table 4 – International Protocol, Treaties and Conventions

CONVENTION	SUMMARY	APPLICABILITY TO THE PROJECT
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar) (1971)	The Convention on Wetlands (known as Ramsar Convention) is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Parties to the Convention are required to designate at least one national wetland for inclusion in a 'List of Wetlands of International Importance' and to consider their international responsibilities for conservation, management and wise use of migratory stocks of wildfowl. Namibia ratified the convention and therefore has to ensure that Ramsar declared sites are kept safe from degradation.	The proposed marina portion of the proposed project is partly sited within a Ramsar designated site, and therefore the development proposals, ESIA and ESMP have followed Ramsar guidelines and are in accordance with the Ramsar Site's Integrated Management Plan (Burger L. , 1998).
United Nations Convention on Biological Diversity	Signed by 150 government leaders at the 1992 Rio Earth Summit, the Convention on Biological Diversity is dedicated to promoting sustainable development. Conceived as a practical tool for translating the principles of Agenda 21 into reality, the Convention recognizes that biological diversity is about more than plants, animals and microorganisms and their ecosystems – it is about people and our need for food security, medicines, fresh air and water, shelter, and a clean and healthy environment in which to live.	The convention applies to the proposed project as the project is sited next to an area with international important biological diversity, which is influenced by various natural and anthropogenic processes. The ESIA has considered the local, national and international importance of the local biodiversity.
Additional Protocol to the Abidjan Convention Concerning Cooperation in the Protection and Development of Marine and Coastal	The Additional Protocol to the Abidjan Convention, to which Namibia is a Party, provides a framework for preventing pollution to the marine environment from Land-Based activities. The objective of this Protocol is to prevent, reduce, mitigate and control pollution	The protocol applies to the proposed project as the project may directly or indirectly affect the marine and coastal environment of the Protocol area, including developments that cause physical alteration of the natural habitat or otherwise result in physical alteration and destruction of habitats. The proponent has taken appropriate measures

CONVENTION	SUMMARY	APPLICABILITY TO THE PROJECT
Environment from Land-Based Sources and Activities in the Western, Central and Southern African Region	from land- based sources and activities on their territories or emanating from any other land-based source, including through the atmosphere, to protect and sustain the marine and coastal environment of the Protocol area. Namibia ratified the convention and ensures compliances to the Convention through the incorporation of such in relevant National Legislation.	in accordance with the provisions of the Convention and the Protocol to prevent, reduce, mitigate and control pollution and degradation of the Protocol area. The ESIA and ESMP including the processes followed throughout the assessment are in line with the requirements of the Convention by virtue of the convention being ratified into National Law.
Benguela Current Convention	The Benguela Current Commission is a multi-sectoral inter-governmental, initiative of Angola, Namibia and South Africa. It promotes the vision of the Benguela Current Large Marine Ecosystem (BCLME) sustaining human and ecosystem well-being for generation after generation. In 2013, these countries signed the Benguela Current Convention, a treaty that entrenches the Benguela Current Commission as a permanent inter-governmental organisation.	The convention applies to the proposed project as the project is sited in the BCLME area and may directly or indirectly affect the marine and coastal environment supporting this ecosystem. The mitigation of pollution is a key focus of the convention applicable to the proposed project, in addition to environmental monitoring and management of biodiversity and ecosystem health. The ESMP provides mitigation measures and monitoring arrangements for the proposed project to ensure compliance with the convention.

The following conventions have been identified as potentially being applicable to the proposed project, however it is assumed that they have been ratified into National Statutes, which are discussed in the next section, and therefore not detailed further:

- United Nations Convention on the Law of the Sea of 10 December 1982;
- Convention for the Prevention of Marine Pollution from Land-Based Sources (1974); and
- Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter 1972.

2.3. NATIONAL STATUTES

Environmental and social national Statutes, which are applicable to the proposed project (have to be complied with or have influenced the design) or have been considered in the assessment and are summarised in Table 5.

Table 5 – National Statutes

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
Environmental Management Act, 2007 (Act No. 7 of 2007) and	The Act aims to promote sustainable management of the environment and the use of natural resources by establishing principles for decision-making on matters	This ESIA report (and ESMP) documents the findings of the ESIA process undertaken for the proposed project, which will form part of the environmental clearance application. The ESIA

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
associated regulations, including the Environmental Impact Assessment Regulation, 2007 (No. 30 of 2011)	affecting the environment. It sets the principles of environmental management as well as the functions and powers of the Minister. The Act requires certain activities to obtain an environmental clearance certificate prior to project development. The Act states an EIA may be undertaken and submitted as part of the environmental clearance certificate application. The MET is responsible for the protection and management of Namibia's natural environment. The Department of Environmental Affairs under the MET is responsible for the administration for the EIA process.	and report have been undertaken in line with the requirements under the Act and associated regulations.
Water Act, 1956	This rather out-dated Act that remains in force, provides for the control, conservation and use of water for domestic, agricultural, urban and industrial purposes; to make provision for the control, in certain respects, of the use of sea water for certain purposes; and for the control of certain activities on or in water in certain areas. The Ministry of Agriculture, Water and Forestry (MAWF) Department of Water Affairs is responsible for administration of the Water Act.	The Act stipulates obligations to prevent pollution of water. The ESMP sets out measures to avoid polluting the environment.
Water Resources Management Act, 2013 (No. 11 of 2013)	This Act provides a framework for managing water resources based on the principles of integrated water resource management. It provides for the management, development, protection, conservation, and use of water resources. This Act has not been approved by parliament, however it is best practice to comply with this Act.	The Act sets out obligations in order to avoid water pollution. These have been incorporated into the ESMP to minimise groundwater pollution during construction. A licence may be required under this Act to undertake certain activities within any wetland; however, as the Act is not enforced (but is applied as best practice), no regulations support the Act to stipulate how a licence should be obtained. As it is not possible to obtain a licence due to the fact mentioned above, it is understood that the environmental clearance will provide the relevant permission to this requirement in the absence of the Act being enforced.

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
		The Ministry of Agriculture, Water and Forestry are stakeholders for this ESIA, therefore consulted throughout.
The Marine Resources Act, 2000 (Act 27 of 2000)	The Marine Resources Act provides for the conservation of the marine ecosystem and the responsible utilisation, conservation, protection and promotion of marine resources on a sustainable basis. It replaces the Sea Fisheries Act 29 of 1992, which in turn replaced the Sea Fisheries Act 58 of 1973. It also replaces the Sea Birds and Seals Protection Act 46 of 1973.	Whilst the construction and operation of the proposed project does not fall under the Act, it is recognised that as an indirect consequence of the use of the development, activities may fall under the Act, therefore the ESMP provides guidelines and requirements under the Act for fishing or harvesting marine resources.
The Namibian Ports Authority Act, 1994 (Act 2 of 1994)	The Act provides for the establishment of the Namibian Ports Authority to undertake the management and control of ports and lighthouses in Namibia, and the provisions of facilities and services related thereto. The Act gives provisions for licence to undertake activities in any port (including entry to a port).	During construction any vessel entering Namport waters will comply with all nautical safety requirements, and will obtain relevant permission or licences where required. During operation, any vessels (recreational boats) using the Marina at the Walvis Bay Waterfront, will pass through the Namport Authority Area and therefore are compelled to comply with Namport regulations and Acts, and will have a licence. Furthermore, the management company (Walvis Bay Waterfront Pty Ltd) will be responsible for ensuring that the approach channel and marina comply with Namport Nautical safety requirements and regulations throughout. The above is stipulated in the ESMP.
Atmospheric Pollution Prevention Ordinance 11 of 1976	The Ordinance provides for the prevention of the pollution of the atmosphere. In terms of Section 5 any person carrying out a “scheduled process” within a “controlled area” has to obtain a registration certificate from the administering authority, in this case the Department of Health.	Schedule two of the Ordinance lists out Scheduled Processes, which includes the handling of Asbestos. An existing building that is to be demolished on the site has been identified to contain asbestos cement roofing material. The removal of this material will be completed by a licenced and registered contractor specialising in asbestos removal.
Hazardous Substance Ordinance 14 of 1974, and associated amendments	The ordinance gives provisions for manufacture, sale, use, disposal and dumping, as well as import and export of hazardous substances listed and categorized in the Act.	Fuel is considered a hazardous substance, and as such the project will register the storage and handling of fuel, and obtain the relevant licence Fuel for the standby generators will be kept on site within the specifications as set out in the Ordinance.
Petroleum Products and Energy Act (Act	The Petroleum Products Regulations under the Act provides obligations for operators	Approximately two 22,000 litre fuel tanks will be on site during construction, therefore the project

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
13 of 1990) and associated amendments and regulations	storing and dispensing fuel into equipment.	will require a licence and certificate to store and dispense fuel. The Regulations set out certain obligations for the duties, specifications, standards, safety and environment. The ESIA and the ESMP have taken these obligations into consideration in the assessment.
Draft Pollution Control and Waste Management Bill (1999)	The Bill amalgamates a variety of legislative frameworks in Namibia, regulating pollution in different sectors of the economy. The Bill promotes sustainable development; to provide for the prevention and regulation of the discharges of pollution.	Although not enacted, the Bill has been applied to the ESIA to ensure any activities potentially giving rise to air pollution, water pollution, noise emissions and solid waste are minimized as far as reasonable practicable and obligations are adhered to.
Seashore Ordinance 37 of 1958	The ordinance provides for the determination of the actual position of the high-water mark and for matters incidental thereto, including surveying.	In the event that the high-water mark needs to be surveyed, it shall be undertaken in accordance with this ordinance and other relevant Namibian Law. This ordinance has not been used to guide the ESIA process.

The following laws are applicable to the project and will be complied with, however are not applicable to the ESIA nor have they influenced or been considered in the assessment process:

- The Labour Act, 2007 (Act No. 11 of 2007); and
- The Labour Act, 1992: Regulations relating to the health and safety of employees at work.

The proponent will develop a specific Safety Management Plan for the construction and operations of the Waterfront independently to the ESIA that will be in place prior to construction.

2.4. National Policy and Plans

Namibia has a range of policies that set out broad course of actions that are required to achieve Government objectives. Policies that are or have influenced the design, or and relate to the scope of the ESIA (have influenced or have been considered in the ESIA process are set out in Table 6.

Table 6 - National Policies and Plans

POLICY	SUMMARY	APPLICABILITY TO THE PROJECT
5th National Development Plan (NDP) and Vision 2030	Namibia's overall long-term development ambitions are provided in the National Vision 2030, which is implemented by five-yearly national development plans (NDP's). NDP5 is the current development plan. NDP5 incorporates the principals and recommendations contained in the Stockholm Declaration on the Human Environment (1972) and associated Action Plan, and Agenda 21 which merged from the Convention on Biological Diversity, Rio De Janeiro (1992).	The proposed project is a development, which forms part of the bigger picture of achieving economic progression, social transformation and environmental sustainability. During the development of the proposal, the principals of NDP5 have been applied where relevant. The information contained in NDP5 has been used to develop the baseline (e.g. population growth predictions and information on different industry sectors (current and future targets).
Towards a Coastal Policy for Namibia, Green Paper, 2009.	The Green Paper provides an outline of the key findings of a long-term study on the conservation and management of the Namibian coast. It sets out the coastal policy and the vision for the coast, as well as principals, goals and objectives for coastal governance. It also presents the options for institutional and legal arrangements towards implementing the emerging Namibia Coastal Policy options for coastal governance in Namibia. The Green Paper will develop into the Coastal Policy White Paper.	The proposed project has been assessed against the Green Paper to ensure the development does not conflict any future policies. The principles of Integrated Coastal Zone Management have been used as guidance in the ESIA, including applying the precautionary approach; the polluter pays principal and applying transparency.
Namibia's Draft Wetland Policy, 2004	This policy strives to complement existing policy instruments regarding sustainable development and sound natural resource management in Namibia. Its implementation provides a platform for the conservation and wise use of wetlands, thus promoting inter-generational equity regarding wetland resource utilisation. The objectives of the policy are to protect and conserve wetland diversity and ecosystem functioning to support basic human needs, to provide a framework for sustainable use of wetland resources, to promote the integration of wetland management into other sectoral policies, and to recognise and fulfil Namibia's international and regional commitments	The objectives and guiding principles in the Policy have been applied to the ESIA, including openness and transparency providing environmental and socio-economic information / decision making regarding wetlands to the public and stakeholders, and using the tool of environmental assessment to help reduce negative impacts and sustainability.

POLICY	SUMMARY	APPLICABILITY TO THE PROJECT
	concerning shared wetlands and wetlands of international importance.	
The National Environmental Health Policy (2002)	The Policy provides a framework and guidelines to prevent and control environmental health hazards and risks that may adversely affect health and quality of life for all the people in Namibia.	The Policy has been used to influence the design of the proposed project, taking into consideration the policies and objectives. Measures set out in the Policy to avoid and manage hazards such as waste management and air pollution have been considered in the identification of mitigation measures described in this report and the ESMP.
The National Policy on Climate Change for Namibia	The policy lays out a number of principles that aim to guide the process of addressing climate change challenges, while also outlining the roles and responsibilities of the relevant stakeholders to ensure the effective implementation of the policy.	The proposed development considered the effects of climate change in the design, in particular sea level rises. The guiding principals and strategies were reviewed to ensure the proposed project is in accordance with the policy.
National Policy on Tourism for Namibia	Provides a framework for the mobilisation of tourism resources to realise long term national goals defined in Vision 2030 and the more specific targets of the NDP, namely, sustained economic growth, employment creation, reduced inequalities in income, gender as well as between the various regions, reduced poverty and the promotion of economic empowerment.	The policy was reviewed during the preparation of the ESIA process and the evolution of the proposed project design. The proposed project aligns with the policy, in particular, the development provides competitive tourism amenities and services, creating a competitive business environment that is market driven and meets international standards.
National Marine Pollution Contingency Plan	A coordinated and integrated system for preparing and responding to ship-sourced pollution incidents, setting out and defining Namibia's oil and hazardous and noxious substances (HNS or chemicals) pollution preparedness and response system.	The measures set out in the Contingency Plan to prevent marine pollution incidents have been considered and included where applicable in the ESMPs.

2.5. Local Policy and Frameworks

The local polices that have been considered in or influence the design development and the ESIA process are described in Table 7.

Table 7 - Local Policy and Frameworks

POLICY	SUMMARY	APPLICABILITY TO THE PROJECT
Integrated Urban Spatial Development Framework (IUSDF) for Walvis Bay (2014)	The IUSDF reviews the current town plan, population projects and social requirements, and sets out a plan to accommodate the town's development.	The IUSDF identifies and allocates the site for the development of a Waterfront Development. The plan for the development depicts a range of uses and activities and specifically excludes any incompatible industrial or related land use and activities. The proposed project is in accordance with the IUSDF. The framework states that a full EIA will be required for the proposed project, as wells as public consultation and an EMP. The ESIA undertaken for the proposed project and subsequent reports satisfy the requirements. In addition, the environmental recommendations listed throughout the framework have been considered and aligned with.
Walvis Bay Lagoon Integrated Environmental Management Plan (1998)	The Management Plan sets out measures to be implemented to manage the Lagoon and avoid environmental impacts, preserve the ecological integrity as well as promote and encourage sustainable use of the Lagoon.	The measures identified in the Management Plan have been considered during the assessment process and the development of the ESMP.
Local Agenda 21	At the Rio Earth Summit in 1992, the United Nations agreed an action plan in order to achieve sustainable development was required, and thus Local Agenda 21 was formed. Local Agenda is a local-government-led, community-wide, and participatory effort to establish a comprehensive action strategy for environmental protection, economic prosperity and community well-being in the local jurisdiction or area. Walvis Bay Municipality implemented a three-year project in 2001, which aim was to make progress towards the sustainable management of Walvis Bay along the lines of the Local Agenda principals. Progress with this agenda was assessed at the World Summit on Sustainable Development, which took place in Johannesburg, South Africa, in 2002 where it was agreed to move from Agenda to Action 21. The Integrated Environmental	The proposed project is in line with the proposed direction and principals set out in the relevant documents. Various data and information from the studies undertaken as part of the Agenda 21 project has been used to develop this ESIA.

POLICY	SUMMARY	APPLICABILITY TO THE PROJECT
	Policy sets out the directions Walvis Bay Municipality will move towards in the forthcoming years to fulfil its responsibilities in managing the environment of Walvis Bay together with the town's residents and institutions.	

The formation of the Walvis Bay Environmental Action Group in 1996 was formed with the specific purpose of raising public awareness of the environmental issues in the Walvis Bay area. This resulted in the formalization of the Walvis Bay Lagoon Integrated Environmental Management Plan (1998), the town's Structure Plan (1999) and the Local Agenda 21 Project to establish an environmental policy for the town in accordance with the Rio Convention. It is within this framework that the Municipality of Walvis Bay function, plan and develop to ensure sustainable and economic growth while ensuring protection of the environmental assist of Walvis Bay.

2.6. OTHER

Other strategic documents, which have been used to guide this ESIA, are listed in Table 8.

Table 8 - Other Strategic Documents

POLICY	SUMMARY	APPLICABILITY TO THE PROJECT
Strategic Environmental Assessment for the Coastal Areas of Erongo and Kunene Regions, 2007	This Strategic Environmental Assessment (SEA) was undertaken for the coastal zones of Namibia to support and inform the decision-making processes affecting biodiversity conservation and sustainable coastal development (DHI Water & Environment, 2007). It provides management guidelines on activities to be conducted in the coastal environs of Namibia.	The recommendations in the SEA have been considered during the development of the proposed project. The SEA states that tourism facilities are to "minimise their impact on the environment in terms of both resource utilisation and visual impact," with mechanisms such as EIAs to assure this. New tourism developments, in particular, are to be "designed in such a way that they are unobtrusive, environmentally sympathetic and, as far as possible, enhance rather than detract from the visual impression of the environment." The report presents the findings of an ESIA and the design of the proposed project has applied these requirements. The findings of the SEA for the Walvis Bay area have been applied to this ESIA. Relevant management guidelines have also been used to develop the ESMP. This EIA Report is compliant with the SEA which stipulates EIAs for accommodation and tourist developments.

3 APPROACH TO THE ESIA

3.1 EIA PROCESS

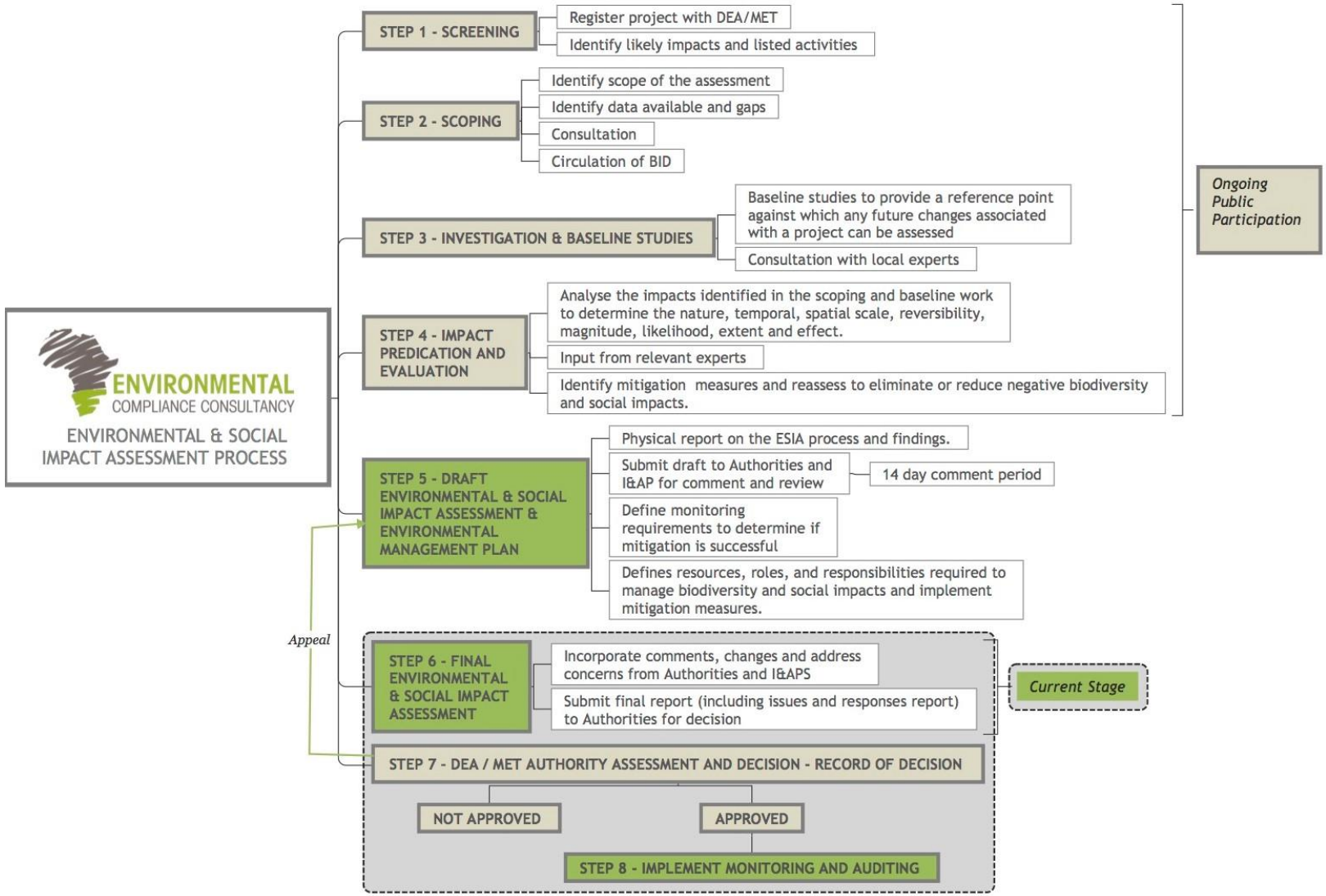
The EIA process in Namibia is governed and controlled by the Environmental Management Act, 2007 and the EIA Regulations No. 30 of 2012, which is administered by the Office of the Environmental Commissioner through the Department of Environmental Affairs of the MET.

An ESIA is the process of identifying, predicting, evaluating and mitigating the potential impacts of a proposed project on the natural and human environment. The aims of the ESIA process and subsequent report are to apply the principles of environmental management to proposed activities; reduce the negative and increase the positive impacts arising from a proposed project; provide an opportunity for the public to consider the environmental and social impacts of a proposed project through meaningful consultation; and to provide a vehicle to present the findings of the assessment process to competent authorities for decision making.

The ESIA process can aid the design development process through incorporating design changes early on into the project planning to avoid or reduce environmental impacts, as well as design aspects such as siting, technology and scale. Mitigation measures and recommendations are identified through collaborative working between the ESIA team and the proponent's team, including engineers, architects and project managers.

The EIA methodology applied to this ESIA has been developed using the International Finance Corporation (IFC) standards and models, in particular Performance Standard 1, 'Assessment and management of environmental and social risks and impacts' (International Finance Corporation, 2017) (International Finance Corporation, 2012); Namibian Draft Procedures and Guidance for EIA and EMP (Republic of Namibia, 2008); international and national best practice; and over 25 years of combined EIA experience. The process flow diagram in Figure 3 provides an overview of the ESIA process followed for the proposed project. The subsequent sections provide further detail of each step and what has been or will be undertaken for each one. Chapter 7 details the assessment methodology.

Figure 3 – ECC ESIA Process Overview



3.2 The Assessment Process Followed by Environmental Compliance Consultancy

This Section describes the process of the ESIA undertaken by ECC, as summarised in Figure 3. Whilst illustrated as a sequential consecutive staged process, some stages may be undertaken in parallel.

Steps 1 – 3 are complete, and where necessary, the findings / conclusions of these stages have been reported in this Chapter or signposted to a separate chapter in this report. Step 4 is the impact prediction and evaluation, and Step 5 is the preparation and completion of the ESIA and ESMP reports. As the main purpose of this report is to present the assessment findings, the assessment method has been detailed in Chapter 7 and findings presented in Chapter 7. Steps 6 onwards are future steps and have been summarised in this chapter.

3.2.1. Limitations, uncertainties and Assumptions

During the ESIA process several limitations and uncertainties were identified. These are listed in Table 9 and are provided in each Chapter where relevant, along with any assumptions made in order to manage the limitations and uncertainties.

Table 9 – Consolidation of all limitations, uncertainties and assumptions.

CHAPTER	LIMITATION / UNCERTAINTY	ASSUMPTION
4: Project Description	The main limitation of the project description was a final construction schedule.	An indicative construction schedule is provided; however, changes to this are likely during the final stages of the design process. This is not considered as a substantial limitation and will not meaningfully affect the conclusions of the assessment.
5: Alternatives & Design evolution	No new or unique limitations specific to this chapter that have not already been identified elsewhere in the ESIA report.	
6: Environmental Baseline	Lack of specific and local air quality data.	An air quality study was not commissioned for the proposed project due to the nature of the development. Existing qualitative baseline information was brought together to provide an indication of the receiving environment, including developments, traffic and industrial activities in the local area, as well as climatic conditions.
	Lack of specific and local noise data.	A baseline noise survey for Namport Container Expansion project was undertaken in 2009. The baseline derived during this survey has been used in this report as the Namport data was deemed suitable for use. A new survey was not commissioned as it was not deemed necessary due to the short duration of noisy construction works (see chapter 4 for the project description); the nature of the proposed project; and the baseline in the Namport report was considered robust and adequate to use in this assessment. It is recognised that the baseline has changed since the construction and operation of Phase 1 of the Namport port extensions. The projections identified in the Namport report have been incorporated into the baseline and assumptions have been made
	Lack of Zoobenthos data.	Zoobenthos: University of Namibia (UNAM) have undertaken further surveys for zoobenthos to assess the potential effects the Namport container terminal project may have on the marine environment. It was agreed that

CHAPTER	LIMITATION / UNCERTAINTY	ASSUMPTION
		these would be made available to ECC for use in this ESIA and therefore additional surveys were not commissioned. These surveys have not been made available, therefore previous baseline surveys (2012) have been used to describe the baseline environment, with recognition that it is likely that the zoobenthos may have deteriorated as a result of the port extensions; therefore, a precautious approach has been applied, which allows the worst-case scenario for potential effects to be identified
	Lack of Turbidity data.	It is understood, that during the construction and dredging operations for Namport's Container Expansion Project (commenced May 2014) turbidity surveys were undertaken by Namport. This data has been requested on various occasions, however has not yet been made available to ECC for incorporation in the ESIA. Assumptions in the assessment have been applied to address this data gap.
7: Methodology	Topic specific assessment guidance and methodology has not been developed in Namibia (e.g. landscape and visual impact assessment methodology).	A generic assessment methodology was applied to all topics using IFC guidance and professional judgement.
	Guidance for CIA has not been developed in Namibia.	The IFC's guidance document (International Finance Corporation, 2013) has been used for the CIA.
	Namport's Container Expansion project EIA was used for the CIA for the proposed project. A comprehensive CIA in the Namport EIA was absent.	Assessment findings under each assessment has been used to develop the proposed project's CIA.
8: Assessment Findings	The specialist studies were undertaken at an early stage of the development of the proposed project. Some included different design options or early designs.	The environmental and social baseline presented in Chapter 3 has been used in the assessment. It is recognized that the project design had evolved since certain specialist studies were conducted. Some conclusions and recommendations of these studies may no longer be applicable, and therefore have not been included in the ESIA report or where required. Where required, consultation with specialists was undertaken to revise the conclusions and recommendation; these have been captured in this chapter where relevant.
	The project description in Chapter 4 has been applied to the assessment.	Any changes to the design, construction methods etc. may alter the assessment findings. If this occurs, the assessment will need to be revisited and further assessment work may be required
	Lack of specific and local noise data.	Lack of noise monitoring data and assessment modelling, a realistic worst-case scenario has been applied and a qualitative assessment has been undertaken
	The creation of approximately 5,000 jobs during operations could potentially result in the migration of an estimated 9,900 people to Walvis Bay (worst case scenario). The specific requirements of these workers and families are unknown and an assessment would be based	The Walvis Bay IUSDF anticipates and plans for population and development growth in the town, and therefore identified required public services (schools, hospitals, shops, residential areas). It is assumed these services are adequate and suitable for the workers and families of the proposed project. An assessment of pressure and demand of services has therefore not been included in the socio-economic assessment.

CHAPTER	LIMITATION / UNCERTAINTY	ASSUMPTION
	on guesses and assumptions.	
	The CIA has been limited to a desk-based literature review as Namibia does not have a centralised data base that logs all planned or realistically defined projects that are applying for Environmental Clearance	A rapid CIA has been undertaken which includes a limited high level assessment for projects that only have concept plans and a more detailed, yet still high level quantitative assessment for projects that are committed (have environmental clearance).
	Namport's EIA for the Container Expansion project is limited.	The CIA has made assumptions where assessment has not been undertaken or where assessment findings are considered to be questionable, and the precautionary approach has been applied.
	A rapid CIA has been undertaken due to certain limitations.	A rapid CIA is considered to be the most appropriate approach considering the limitations, as set out in the IFC CIA guidance (International Finance Corporation, 2013).

3.2.2. STEP 1 – SCREENING

STATUS: COMPLETE

The first stages in the ESIA process is to register the project with the DEA/MET and undertake a screening exercise to determine whether it is considered as a listed activity under the Environmental Management Act, 2007 and associated Regulations and if significant impacts may arise from the project. The location, scale and duration of project activities will be considered against the receiving environment.

On the 11th August 2016, a meeting was held between the Permanent Secretary of the MET and Urban Dynamics to formally register and provide an introduction to the proposed project. Under section 32 of the Environmental Management Act, 2007, a notification and request for a scope of work for the proposed project was made to the MET following the meeting (see Appendix B). The notification provides the intention of the proponent to develop erven 4941 and remainder of Erf 4939 into the Walvis Bay Waterfront; states the Listed Activities the project triggers; and provides a plan of the proposed project site.

It was concluded that a detailed ESIA was required as the proposed project is considered as a Listed Activity as there may be the potential for significant impacts to occur.

3.2.3. STEP 2 – SCOPING

STATUS: COMPLETE

3.2.3.1. SCOPE OF ASSESSMENT

Where an ESIA is required, the second stage is to scope the assessment. The main aims of this stage is to determine which impacts are likely to be significant (the main focus of the assessment); scope the available data and any gaps which need to be filled; determine the spatial and temporal scope; and identify the assessment methodology.

In response to the Notification Letter, the Office of the Environmental Commissioner in consultation with the Ministry of Fisheries and Marine Resources and the Ministry of Works and Transport, confirmed in writing on the 27th October 2016 (Appendix C), that the level of assessment for the proposed project to be an EIA and provided recommendations on the scope of assessment; as stated previously, this is considered as the Terms of Reference for the ESIA.

Subsequently, scoping of the ESIA was undertaken by the ESIA team. The scope of the assessment was determined through undertaking a preliminary assessment of the proposed project against the receiving environment obtained through a high-level desktop review. Feedback from consultation with MET and stakeholders also informed this process. The following environmental and social topics and sub topics were scoped into the assessment, as there was potential for significant impacts to occur:

- Built environment
- Infrastructure and waste management
- Socio-economics
    - Employment
    - Local businesses
    - Community and recreational facilities
    - Tourism
    - Cultural heritage
- Sense of place
    - Landscape and visual amenity
    - Residential and recreational views
    - Lighting
- Air Quality
    - Dust emissions
    - Aerial pollution (air emissions e.g. oxides of nitrogen; nitrogen dioxide, particulate matter; sulphur dioxide and carbon monoxide
- Noise and vibration
- Climate and meteorology
- Groundwater
- The marine environment
    - Oceanography and hydrodynamics (including tides and currents)
    - Bathymetry
    - Sedimentology and siltation
    - Water quality
    - Marine habitats and species

The following topics were scoped out of the ESIA, as no likely significant impacts are predicted, therefore are not discussed further in this report:

- **Soils and geology:** the surrounding soils and geology are common and have no significant value. The proposed project will require some ground excavation and limited material will be generated on shore. Material generated from marine activities will be reused on site or relocated to an alternative site. The geotechnical aspects are considered as an engineering design consideration.
- **Terrestrial ecology:** The proposed project site is located in an urban and industrialised area with limited terrestrial ecological features within or surrounding the proposed project site.
- **Surface water:** No surface water features are present in the locality of the site. Any site drainage during construction and operation is considered in the marine environment assessment, as this will be the receptor for any discharges.

Transboundary impacts were also scoped out of the assessment as impacts on neighbouring countries (e.g. South Africa, Angola and Botswana) were deemed unlikely due to the nature of the proposed project.

A health and safety assessment has not been undertaken as part of this ESIA. A separate health and safety management plan will be developed by the construction team and reported separately to the relevant authorities.

This will include aspects such as spread of HIV. In addition, the requirement for disaggregation is not applicable to this ESIA.

The lifetime of the proposed project to be assessed includes:

- Construction and relocation of the existing sporting facilities;
- Demolition of the existing facilities; main construction works;
- Site preparation and rerouting existing services;
- Main construction; and
- Operations of all developments.

The scope of assessment for the operations of the proposed project is limited to an extent. Even though the proposed project provides a space for hotels, retail, restaurants, marine activities, residences and other community facilities, the companies that will occupy these spaces and their activities are unknown at this stage. The number of people visiting the proposed project and the behaviour of visitors and users cannot be fully predicted. The ESIA and ESMP have been undertaken taking these discrepancies into consideration. Where possible, measures have been identified to pre-empt potential impacts. The assessment includes likely potential incidents and accidents as a result of the proposed project. A full accidents and fault scenario assessment has not been undertaken.

The buildings of the proposed project are designed for a life span of 40 plus years. Before and during this time, it is envisaged that care and maintenance, refurbishment and restoration will be applied to extend the buildings life. The buildings and the waterfront are designed to be a long-term permanent fixture of the urban landscape. Decommissioning and site restoration of the proposed project is therefore not included within the scope of the assessment, however recommendations for this activity should it be required are included in the Decommissioning ESMP (see Appendix A).

3.2.3.2. STUDY AREA

This ESIA study area has been defined according to the geographic scope of the receiving environment and potential impacts that could arise as a result of the proposed project. A study area of 1 kilometre from the boundary of the proposed project site was applied as a standard for all desk-based studies, see Figure 4. For the following topics, the study area was extended to ensure sensitive receptors were identified and described.

- **Socio-economics:** the boundaries of the town of Walvis Bay; and
- **The marine environment:** the boundaries of the Bay area, including the Lagoon.

Specialist surveys had defined study areas and are discussed in the relevant reports (Appendices F, G, H I and J).

In addition to these study areas, areas where dredged material will be relocated to have also been reviewed and sensitive receptors identified and reported where applicable.

Figure 4 - General Study Area [Source: Google Earth, 2018]

3.2.3.3. AVAILABLE DATA

A desktop review of available baseline data was undertaken during quarter two of 2017. The aim of this activity was to identify what, if any, data is missing to form a robust baseline to be used in the assessment. The review focussed on the environmental and social topics and sub topics that would most likely be significantly affected by the Project. Several data gaps were identified and as a result, surveys and studies were commissioned. These surveys and studies are detailed in the Baseline Chapter (Chapter 6).

3.2.3.4. CONSULTATION

STATUS: COMPLETE AND ONGOING

Public participation and consultation is a requirement stipulated in Section 21 of the Environmental Management Act, 2007 and associated regulations for a project that needs an environmental clearance certificate. Consultation is a compulsory and critical component in the ESIA process in achieving transparent decision-making, and can provide many benefits.

The objectives of the stakeholder engagement process is to:

- Provide information on the project, introduce the overall concept and plan;
- Clarify responsibility and regulating authorities;
- Listen and understand community issues, concerns and questions;
- Explain the process of the ESIA and timeframes; and
- Establish a platform for ongoing consultation.

The proposed project has developed through several years of planning and consultation with stakeholders and the public. Due to the importance of engaging the public in the ESIA process, ECC has taken additional steps to ensure

that the stakeholder engagement process reaches a wide range of stakeholders and I&APs, and that the process allows for genuine participation, which would influence the evolution of the design of the proposed project.

Chapter 9 provides a summary of the consultation process, and collates stakeholder comments / questions and ECC's responses. These have been considered and incorporated throughout the ESIA. Appendix D provides the evidence of stakeholder engagement. Appendix E provides the Background Information Document (BID), which was and issued to the general public and stakeholders in June 2017, which presents an overview of the proposed project; the EIA process; the need for the proposed project; and any alternatives considered, with the aim to provide stakeholders an opportunity to register as an I&AP. The BID was the first stage of consultation.

3.2.4. Step 3 – Investigation & Baseline Studies

STATUS: COMPLETE

The next stage of the ESIA process is to undertake baseline studies. A robust baseline is required in order to provide a reference point against which any future changes associated with a project can be assessed and allow suitable mitigation and monitoring to be identified.

The existing environment and social baseline for the proposed project was collected through various methods:

- Field surveys;
- Desk-top studies;
- Consultation with stakeholders (local authority's environmental specialists); and
- Door to door engagement with neighbouring residents.

During the baseline studies, experts were consulted with through face-to-face meetings, telephonic and email correspondence. The baseline focuses on environmental and social receptors most sensitive to change or receptors that have a high value of importance.

The environmental and social baseline is provided in Chapter 6, focussing on the topics that have been scoped into the ESIA, as listed in 3.2.3.1.

3.2.5. Step 4 – Impact Prediction and Evaluation

STATUS: COMPLETE

The key stage of the ESIA process is the impact prediction and evaluation stage. This stage is the process of bringing together project characteristics with the baseline environmental characteristics, and ensuring all potentially significant environmental and social impacts are identified and assessed. The assessment considers all stages of the project's life cycle that is scoped into the assessment (section 3.2.3.1). It is an iterative process that commences at project inception to the final design and project implementation (construction and operations). The impact prediction and evaluation stage was undertaken between January and December 2017, and refined further after feedback from I&APs was obtained through consultation of this ESIA report in January 2018.

The final design of the proposed project has been assessed, as well as alternatives considered during the design process in accordance with the Environmental Management Act, 2007.

Chapter 7 in this report sets out the assessment methodology used to assess the project against the environmental and social baseline that would be affected. Chapter 8 presents the findings of the assessment, focussing on the significant impacts or those considered sensitive to the community.

3.2.6. STEP 5 – DRAFT ESIA REPORT AND ESMP

STATUS: COMPLETE

The ESIA report documents the findings of the assessment process, provides the public with opportunity to comment and continued consultation and forms part of the environmental clearance application. The ESMP provides measures to manage the environmental and social impacts of the proposed project and outlines specific roles and responsibilities to fulfil the plan.

This ESIA report focuses on the significant impacts that may arise from the proposed project as described in Step 4. These impacts are discussed in Chapter 8.

This ESIA report was issued to stakeholders and I&APs for consultation on the 15th January for a period of 21 days, meeting the a mandatory requirement of 14 days as set out in the Environmental Management Act and associated Regulations. The aim of this stage was to ensure all stakeholders and I&APs have the opportunity to provide final comments on the assessment process and findings and register their concerns.

3.2.7. STEP 6 – FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT, AND ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

STATUS: CURRENT STAGE

All comments received during the I&AP public review period have been collated in an Addendum report (previously referred to as the Consultation report), which will accompany this ESIA report when submitted to the DEA. All comments have been responded to either through providing an explanation or further information in the response table, or sign posting where information exists or new information has been included in the ESIA report or Appendices. Comments have been considered and where they were deemed to be material to the decision making or enhanced the ESIA and ESIA report have been incorporated in to this ESIA report.

The final ESIA report and associated appendices, and the Addendum report are available to all stakeholders on the ECC website www.eccenvironmental.com All I&APs have been informed via email.

The ESIA report, appendices and Addendum are formally submitted to the Office of the Environmental Commissioner, DEA as part of the application for an environmental clearance certificate.

3.2.8. STEP 7 – AUTHORITY ASSESSMENT AND DECISION MAKING

STATUS: FUTURE STAGE

The Environmental Commissioner in consultation with other relevant authorities will assess if the findings of the ESIA presented in the ESIA report and Addendum report are acceptable. If deemed acceptable, the Environmental Commissioner will revert to the proponent with a record of decision and any recommendations.

3.2.9. STEP 8 - MONITORING AND AUDITING

STATUS: FUTURE STAGE

In addition to the ESMP being implemented by the proponent, a monitoring strategy and audit procedure will be determined by the proponent and competent authority. This will ensure key environmental receptors are monitored over time to establish any significant changes from the baseline environmental conditions caused by project activities.

4 PROJECT DESCRIPTION

4.1 INTRODUCTION

This chapter provides a technical description and presents the main features of the proposed project. This chapter includes:

- The geographical limits of the project
- Land ownership and zoning
- A description of the proposed Waterfront
- Major components of the layout
- Construction activities
- Final design and Operations
- Refurbishment and restoration

4.2 SITE AND SURROUNDINGS

4.2.1. ENVIRONMENTAL SURROUNDINGS

Walvis Bay is the third most densely populated town in Namibia and has developed along the coastline of the Walvis Bay area due to the fishing industry and development of the Harbour, and geographical restrictions such as the Dune belt to the east and south and the Lagoon to the south-west. The key features of Walvis Bay are the main Bay area; the Harbour; the Lagoon; the Salt Works, Salt Pans and Evaporation Ponds; and the Peninsular reaching up to Pelican Point.

The proposed project site is located approximately 1.5km south of the town centre (the central business district (CBD)), immediately south of the Namport container terminal on the seafront at the mouth of the Lagoon (see **Figure 5**). The surrounding area is mixed with industrial, commercial and residential uses.

4.2.2. PROPOSED PROJECT SITE

The site allocated for the proposed project as per the 2014 Walvis Bay IUSDF (Walvis Bay Municipality, 2014) is both on land and in the marine environment, as illustrated in Figure 5.

The area of land required to develop the proposed project is the area that borders Atlantic Street to the north, KR Thomas Street to the south and 4th Road to the east. The south end of the proposed site boundary extends past The Esplanade and the Lagoon Promenade to the south. The area within the marine environment is approximately 50 to 80m outwards from the coastline towards The Raft Restaurant, extending just past KR Thomas Street and in front of the Protea Hotel.

The site is approximately 9.5ha; approximately 7ha onshore and 2.5ha offshore. A cricket oval, swimming pool, tennis and jukskei courts currently occupy the site. These sporting facilities will be relocated; the sites are presented in Figure 6. The cricket oval will be relocated to the soccer field in Kuisebmund, a residential area, and the swimming pool, tennis and jukskei courts will be located to the Jan Wilken site, the central sporting stadium in Walvis Bay located in the centre of town.

Figure 5 - Proposed Walvis Bay Waterfront Project Site Location

Figure 6 – Proposed sites for the relocation of sporting facilities

4.3 LAND OWNERSHIP AND ZONING

4.3.1. THE PROPOSED PROJECT SITE OWNERSHIP

The majority of the proposed project area is owned by Walvis Bay Municipality and is located within the Walvis Bay Town Planning scheme on erven 4941 and remainder of Erf 4939 (refer to Figure 7). The area is currently zoned as Private Open Space and is freehold.

The on-shore area of the proposed project site does not extend beyond the Protea Hotel and excludes the Yacht Club and existing restaurants on the water's edge located on Namport land. The Road Reserve between the High-Water mark and the southern site boundary belongs to the Walvis Bay City Council; the Proponent is in the process of procuring a long-term lease over this area. The off-shore area in the Lagoon is under the control of the Government (managed by MET) and owned by the State. All relevant approvals for transfer of ownership will be obtained prior to construction and any surveying of the high-water mark to support this process will be undertaken in accordance with Namibian Law.

The proposed project does not include the Raft Restaurant located in the Lagoon that is privately owned, however an option remains to include this in the proposed project, should an agreement with the operator of The Raft and the land owner be concluded. This is currently under investigation.

Figure 7 – Project Evens

4.3.2. REZONING

The application for rezoning of erven 4941 and 4939 is currently being undertaken by Urban Dynamics Pty Ltd. Once the rezoning and construction of the proposed project is complete, office space and residential sectional titles will be registered in accordance with the Sectional Title Act, 2 of 2009, then sold in accordance with sales agreement between the owner and the prospective buyer. The Sectional Titles will be incorporated into the rateable area for Walvis Bay Municipality.

4.3.3. ADJACENT AREAS

The land ownership and zoning of adjacent areas are not expected to be influenced or altered by the proposed project. The two privately owned erven on the corner of Atlantic Street and Esplanade Drive (Erf 4623 and Erf 4940) do not form part of the proposed project site (these ervens are indicated as the grey area in north east corner of erven 4941 seen in Figure 7).

4.4 PROJECT PROPOSALS

4.4.1. DESIGN PHILOSOPHY

The proposed project was developed through an analysis of the city's history, structure, character and challenges in response to the area's development as a new residential and commercial hub with a functional marina. The design philosophy was to maintain Walvis Bay's dominant maritime identity, while simultaneously strengthening the city's character with various urban elements, such as hotels, restaurants, offices, amphitheatres, public squares and promenades. The core design principal was to create an "urban loop" in the form of a canal boulevard, strengthening the inner street and public spaces to those of the marina front itself. Pedestrians are therefore able to explore the variety of recreational spaces in the new built-environment, thus functioning as a natural extension of the city's urban context.

By applying this philosophy, the proposed project integrates into the site and provides scenic vistas of the surrounding world-renowned Lagoon and bird life. It will form a hub for both the local community and tourists to enjoy.

4.4.2. PROJECT COMPONENTS

The proposed project will include the provision of several types of infrastructure and multiple land uses within the proposed site. The following components will constitute the proposed project. Areas have been included where available to provide an indication of land use.

- New community and sporting facilities – swimming pool, tennis and jukskei courts, and cricket grounds;
- Upgrades to bulk services and infrastructure, including sewerage lines and pump station;
- A Marina (Outer and Inner Marina), including:
    - Access channel to enter the Outer Marina;
    - Outer Marina with a breakwater / marina wall;
    - Inner Marina made of water canals for leisure craft moorings;
- Public open outdoor spaces covering approximately 1,600m^2, to be used for community recreation, activities and functions, as well as an area for informal vendors trade goods;
- Hard and soft landscaping, within and around the site;
- An amphitheatre to be used for local and touring artists, schools and the community;
- A multipurpose business and conference centre of more than 2,947m^2, including a plenary hall of approximately 1,450m^2, to encourage business development and provide a multi-functional facility;
- Offices of approximately 8,700m^2 with 400 parking bays;
- A total of 450 Residential units with an area of approximately 10,000m^2 with two car parking bays per unit;

- Approximately 38 Serviced apartments managed by the hotel;
- Two hotels: one four-star hotel, with a gross building area of approximately 10,800m^2, with 108 car parking spaces and 91 rooms; and the one three-star with a building area of approximately 5,800m^2, 80 car parking spaces and 120 rooms;
- Restaurants with a gross leasable area of approximately 2,600m^2;
- Retail space with approximately 23,800m^2 gross leasable area;
- Approximately 1,700 Parking bays in total (at ground level and semi basement, an area of approximately 23,300m^2);
- Internal road and pedestrian access routes; and
- Upgrade of existing road intersections.

The detailed layout plans for the proposed project (refer to Figure 8 and Figure 9) provides the framework of the proposed project and highlights the range of land uses and activities.

Restaurants, retail area and hotels are located on the northern side of the proposed project site, with residential properties to the south. The buildings will be of various heights across the site; with the tallest building (approx. 24m tall) strategically positioned in the middle of the development site to prevent impacts on the surrounding neighbouring properties. The main access point will be from Atlantic Street; main vehicle routes will direct traffic along 5th road and Atlantic Street.

GROUND FLOOR PLAN

PORTION A / PORTION B / MARINA

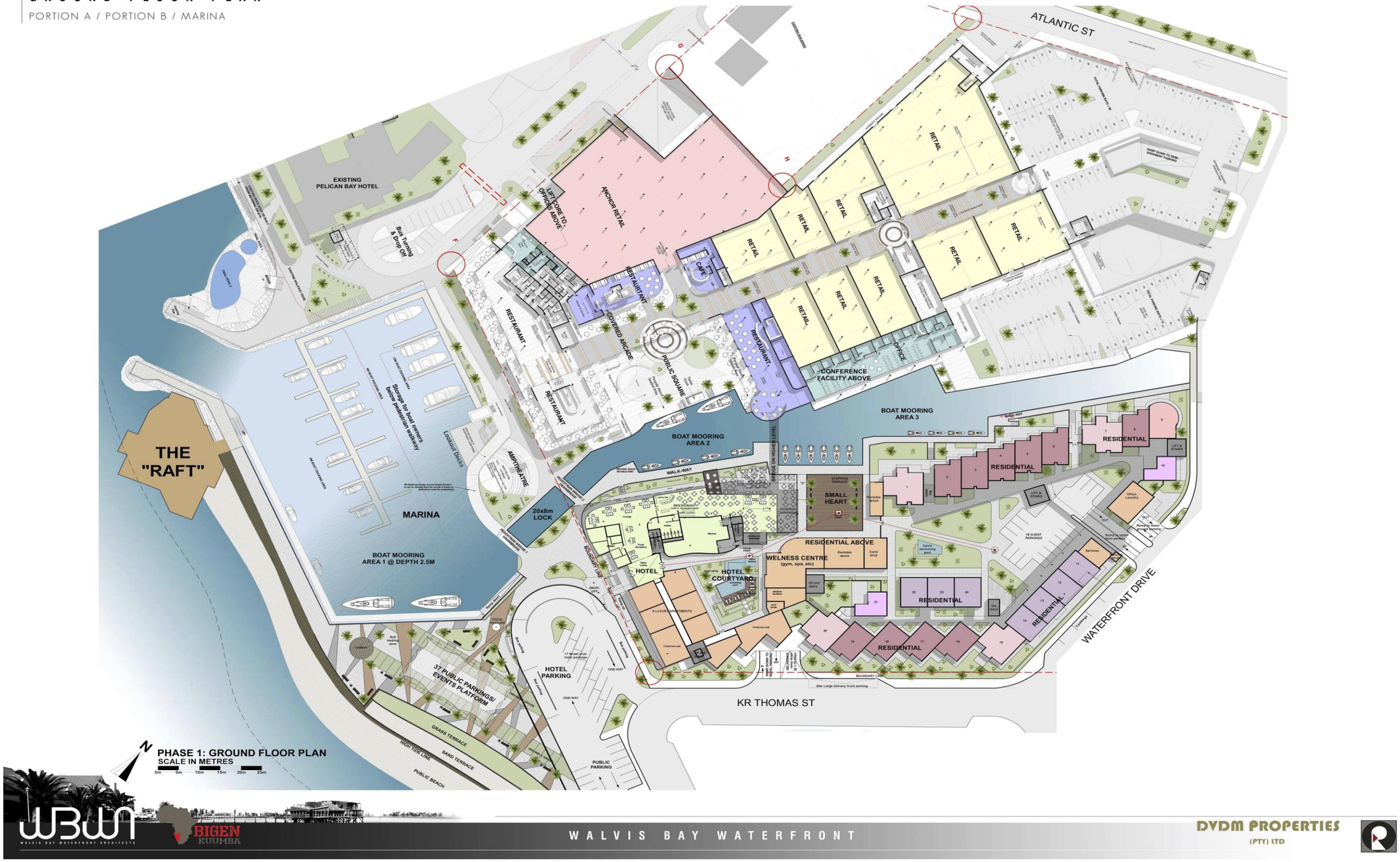


Figure 8 - Walvis Bay Waterfront Detailed Plan

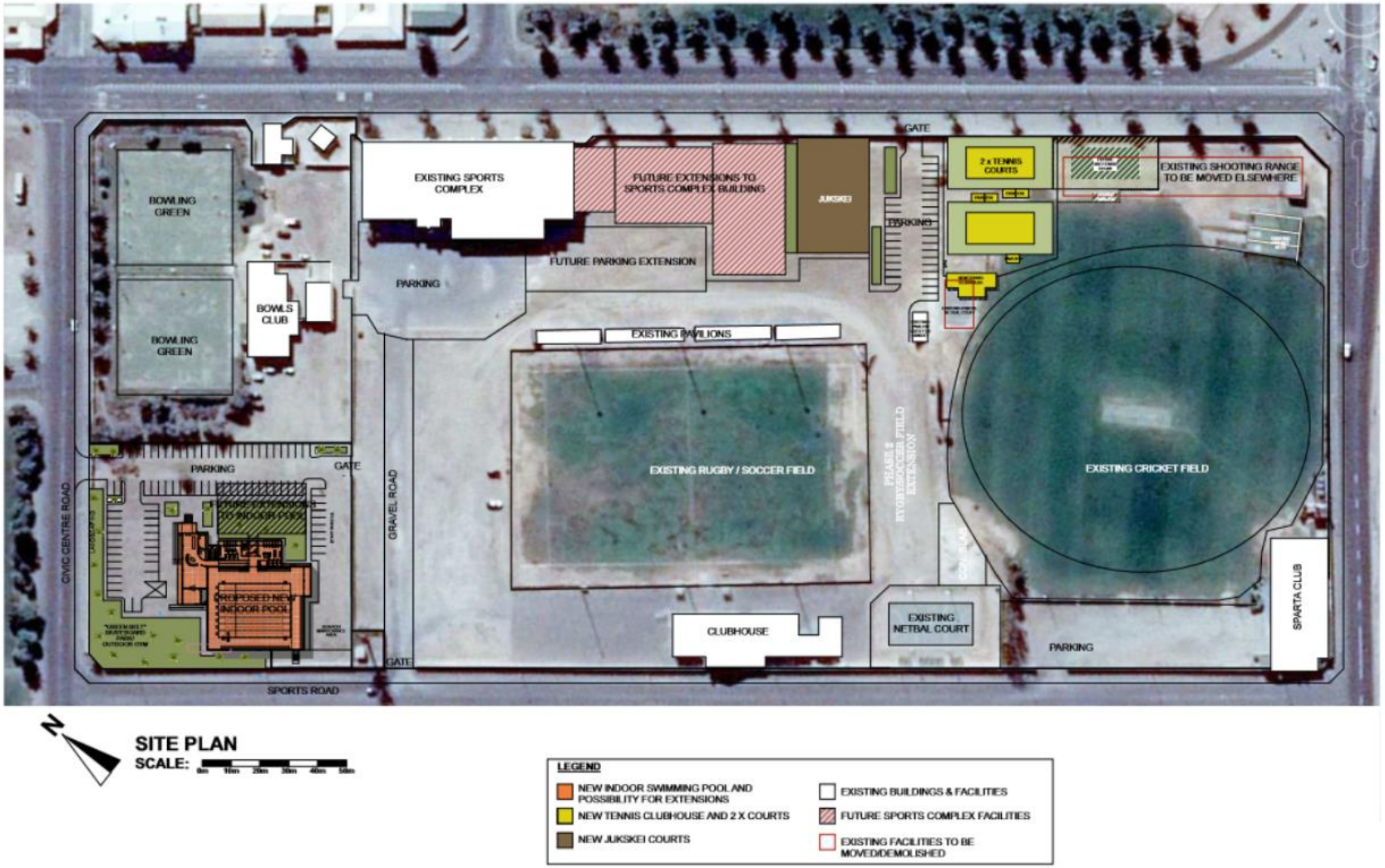


Figure 9 – Proposed Layout for Relocated Sporting Facilities at Jan Wilken Stadium

4.4.3. ENHANCEMENT MEASURES

To enhance the experience for both tourists and the local community, education facilities will be provided, including notice boards along the waterfront presenting local environmental information, Ramsar information, and data obtained during regular monitoring on the marine environment.

The architects have taken the micro-climate and it's harsh weather conditions into account and envisioned a design that would portray elements of both the Namib Desert and the Atlantic Ocean. The following features have been included in the design (embedded design measures):

- Existing palm trees or established vegetation will be removed during site preparation, retained and re-established into the final layout of the proposed project;
- Locally sourced materials such as marble and stone will be used for the construction of buildings;
- Less affluent areas will be provided access to new sporting facilities (cricket grounds); and
- Existing community sporting facilities will be enhanced through the development of new swimming pool, tennis and jukskei courts. The new facilities will be of the same standard (if not higher) of existing facilities.

4.5 STAKEHOLDER INFLUENCE THROUGH CONSULTATION

As discussed in Chapter 3, consultation provides an opportunity to obtain valuable information from local stakeholders (including the public) that can influence the design development process and achieve a mutually beneficial outcome.

The design development process, which includes the design of the proposed project built components (listed above) and construction methodology, have taken into consideration feedback from consultation with the local community and other stakeholders to ensure desirable planning features and aspects have been incorporated into the proposed project. Appendix D provides the collation of all consultation comments, responses and references which section of this ESIA report the information is contained.

The following considerations have been incorporated into the project design as a result of feedback from the public:

- Pedestrian and visual connections between the Esplanade, The Raft, the Yacht Club and the Protea Hotel to allow free flowing pedestrian movement between these facilities as well as continuous pedestrian access along the Promenade;
- A designated trading space for informal vendors;
- Facilities for people to go to enjoy the restaurant, wine and dine experience;
- An attractive waterfront with diverse activities and functions that will compliment future development plans for Walvis Bay;
- A traffic alternative will be provided for the closure of the Esplanade road near the Raft;
- Access for patrons to the Raft restaurant will be maintained during the construction period (see construction section);
- The use of building materials that will tolerate Walvis Bay' harsh environment; and
- Building heights adjusted and set back into the development to avoid sunlight being blocked onto neighbouring homes.

The design has also taken into consideration proposals within the IUSDF (Walvis Bay Municipality, 2014), including providing connectivity between the proposed project and other potential developments along the Lagoon and Bay area, including the potential Namport waterfront and marina development. This is discussed further in sections 4.10 and 6.11.2.

4.6 Limitations, Uncertainties and Assumptions

The main limitation identified during the production of this ESIA report was a final construction schedule. An indicative construction schedule is provided; however, changes to this are likely during the final stages of the design process. This is not considered as a substantial limitation and will not meaningfully affect the conclusions of the assessment.

4.7 Site Preparation and Construction

4.7.1. Schedule and Sequencing

The duration of the construction stage for the proposed project will be approximately 3.5 years. The development of the proposed project site will be undertaken in a phased approach: Phase 1 will be developed first followed by Phase 2, which will be market driven depending upon demand and minimising the potential economic impacts on the local housing market. Phase 2 will be constructed as soon as possible after Phase 1 to ensure the construction period is not overly extended affecting the neighbouring community.

- **Phase 1** includes the development of the marina, residential, commercial, retail, and conference center, which is focused around the waterfront and outer marina, and covers the majority of erven 4941.
- **Phase 2** comprises of residential, hospitality facilities and a portion of the inner marina (canal) will be constructed on erven R 4939.

The geographical extent of the two Phases are illustrated in Figure 8.

An indicative timeframe of construction activities for each Phase is presented in Table 10, along with an indication of the sequencing of activities; however, some activities may be undertaken in parallel with one another. Further information of each of these activities is presented in the following sections.

Table 10 - Development schedule

	PLANNED ACTION	ESTIMATED STARTING MONTH	ESTIMATED COMPLETION MONTH
Phase 1	Construction and relocation of sports facilities (tennis and jukskei courts and swimming pool)	May 2018	March 2019
	Demolition and site preparation	May 2018	July 2018
	Services realignment and upgrades	July 2018	Feb 2019
	Main construction (hotel, commercial, residential)	September 2018	September2020
	Marina development*	September 2018**	January 2020
	Walvis Bay Waterfront Mall and Marina opening		October 2020
Phase 2	Relocation of cricket oval	January 2020	June 2020
	Demolition and site preparation	January 2020	May 2020
	Main construction	May 2020	August 2021
	Opening of hotel		September 2021
Both	Completion of proposed project		End of 2021

* dredging activities will be undertaken in winter months, from May to August to minimise impacts on sensitive feeding seasons

**marine works will avoid sensitive marine mammal breeding times and should be minimised between June to September

4.7.2. Construction Workforce

Workforce requirements for the proposed project will be similar for both Phases with the exception that Phase 1 will require specialised teams to undertake the marina construction activities. Phase 2 may require some specialists; however, the majority will be required during Phase 1. The estimated workforce is approximately 500 persons who will be contracted on to the project. The role types expected for the proposed project are as follows

- General laborer's, truck and machinery operators, crane operators = 400 people.
- Trade qualified: 50 people.
- Senior contract workers = 25 people. These workers would include project managers, foremen and other contract workers.
- Specialist: 25 people, for example marina construction.

The use of local resources, which includes Namibian workers and contractors, is a pre-agreed principal of the proponent. Between 60 – 80 % of workers will be from the local community. Accommodation will be provided for out of town contractors in a contractor's camp, which will be sited on an area identified by the municipality and would not be on the proposed project site due to limited area. The contractor camp will be a standard camp providing accommodation, food preparation and cleaning facilities. It will be able to accommodate between 200 – 300 workers.

4.7.3. Construction Working Areas

The construction working areas will be limited to the areas illustrated on Figure 7. The marina construction area will encroach into the Walvis Bay Lagoon, occupying approximately 0.014% of the Walvis Bay Wetland Ramsar site (both in the construction phase and operational phase).

4.7.4. Phase 1 Construction Activities

Phase 1 is the western side of the proposed project site, adjacent to the marina. Construction activities occurring in this first phase of works is provided in this section. Phase 2 is discussed in section 4.7.5. Repetition is avoided where similar activities are undertaken, this is highlighted where relevant.

4.7.4.1. Relocation and Demolition of Existing Facilities

Prior to construction commencing, an aesthetically pleasing block-out barrier/fence will be erected around the site boundary to reduce the visibility of the construction site. This barrier/fence will provide public safety and controlled project security for the duration of the project. A demarcated single entry and exit point will be established off Atlantic Street. Traffic management measures will be implemented at this point, for example banksmen and sign posts.

The new sporting facilities construction and demolition of existing facilities will happen simultaneously. The demolition of the existing swimming pool, tennis and jukskei courts will be undertaken at the same time as the construction of the new relocated facilities. The demolition of the cricket clubhouse will also occur in Phase 1 and a temporary cricket club will be provided next to the oval until the relocated cricket club is constructed in Phase 2. This area is needed for the construction of the new road 'Waterfront Drive'. The cricket oval should not be affected by construction works, and will remain a functional during Phase 1 construction.

Key activities associated with demolition of the existing facilities include the following:

- Cleaning out and removal of all redundant equipment;
- Removal of timber roof frames and ceiling boards, metalloid roofing and concrete slabs;
- Removal of asbestos cement roofing;
- Removal of cement foundations of existing buildings;
- Removal of materials such piped services, hard standing, concrete foundations, swimming pool;
- Removal of septic waste; and
- Reclaim materials that can be reclaimed, reused or recycled at the relocated facilities.

Structures will be taken down using a combination of plant, machinery and hand tools. Building demolition waste will include reinforced concrete, concrete, electrical and mechanical services and other miscellaneous building materials. Where appropriate dismantled components and other materials will be stored on site until certain quantities have been collected and can be moved off-site for recycling, reuse or salvage (e.g. timber roof structures and floor boarding). Other waste will be disposed of at the Municipal landfill.

The following best practice environmental safeguards will be implemented during demolition works.

- Water sprays will be used (as required) across work zones and cleared areas to suppress dust,
- During windy months, the direction of prevailing winds will be considered in relation to the impact of dust on surrounding environment, housing, hotel and restaurants, and suitable mitigation methods implemented (e.g. water trucks).

An aesthetically pleasing block-out fence / screen will be erected around The Raft Restaurant to ensure patrons of the Raft are not affected by a construction view. Safe access will be provided at all times for staff and patrons of the Raft.

Prior to construction works of the new swimming pool, tennis and jukskei courts, some minor site preparation works may be required on the Jan Winkle site. The construction of the relocated facilities will take approximately 12 months, and construction activities will include site preparation, laying foundations, erection of buildings and associated infrastructure. Plant and equipment required for the construction of the new facilities will include a standard construction fleet such as trucks, loaders, crane, hand tools and builders. All costs associated with the relocation of the sporting facilities will be carried by Afrikumba and not the municipality. The operations of the facilitates will be the responsibility of the Municipality.

4.7.4.2. Site Preparation

Site preparation will occur concurrently with the demolition of existing buildings and structures. The main aim of this construction stage is to prepare the site for main construction activities, which will include clearance and retention of vegetation (see section 4.4.3), removal of rubble and any existing boundaries (fences, walls, etc.), and minor earthworks.

Suitable drainage at an early stage will be installed around the perimeter and on site to ensure any surface run off is collected, diverted and avoids running on to neighbouring properties.

The Esplanade road will be closed at the beginning of this stage and an alternative route and appropriate signage will be provided.

4.7.4.3. Re-routing Existing Services

The municipal sewerage line and some infrastructure is currently routed through the site. The current sewerage system is unable to cope with the current demand, causing septic tanks to back-flow and blocked toilets in residential dwellings. The system currently carries wastewater from Namport, the Protea Hotel, The Raft Restaurant and surrounding residential areas. The proposed project will increase demand on this services and infrastructure and therefore they will be upgraded as part of the project.

Prior to main construction activities in Phase 1, these services will be re-routed and upgraded thereby providing improvements to the local community and Walvis Bay Municipality.

The realignment of the existing sewer main is a critical task to be completed early in the project. At the start of construction, a sewer deviation line will be installed around the proposed project site on the Raft Restaurant side that will connect to the existing sewer in KR Thomas and 2nd Street. This is to ensure that existing services to all users are accommodated for the full duration of the proposed project. The final route of the services to the Raft Restaurant will be sited along the breakwater wall.

During construction a new sewer line and pump station will be built. The pump station will be located on the southern corner of the proposed project site with the new pump line to be laid parallel to the existing pipeline that connects the municipal sewer into the fairways pump station. The proposed project will not require this service to be commissioned until the project is in the operational phase in 2020; however, it will be commissioned prior to project completion and as early in the construction phase as possible to accommodate and assist the Walvis Bay Municipality with the current sewer flow problems in the area.

All other services, including water and electricity will be constructed as required for the proposed project during construction and connected to the existing networks when required.

All services will be belowground and will be installed following standard construction methodologies for the applicable service.

4.7.4.4. Main Construction

Construction would involve different combinations of the following activities:

- Site mobilisation and formation of the construction compound;
- Minor earthworks including raising low-lying land (at 1.2 above Mean Sea Level (MSL)) to approximately 2.6m above MSL;
- Closure of The Esplanade and the Lagoon Promenade at the site, and provision of diversions;
- Site office and parking located on the Namport side of the proposed project site away from residential areas as far as possible;
- Construction material will be stored and off-loaded on the Namport side of the project site;
- Installation of drainage infrastructure;
- Construction of the marina (more information is provided in section 4.7.4.5);
- Construction of the marina lock/crane system and canal
    - HDPE liner installation for the internal marina canal
    - Cement lining of the canal
- Construction of buildings (residential, commercial, retail, and conference centre):
    - Construction of building foundations

  - Construction of steel frames
  - Construction of walls
  - Construction of roof
  - Installation of cladding
  - Installation of utilities and internal structures and finishing's
  - Connections to services (gas, water and electricity)
  - Final equipment installation and furnishings
- Construction of the Waterfront promenade, pedestrian routes and open green spaces;
- Construction of the bridge and new Waterfront Drive;
- Upgrades to intersections from Waterfront Drive;
- Reinstatement and plantation of new vegetation (soft landscaping); and
- Hard landscaping.

The Raft restaurant will remain intact and will be incorporated into the urban fabric of the Walvis Bay Waterfront; it may be refurbished in future, which will be negotiated and agreed with the operators of The Raft and the Walvis Bay Waterfront.

4.7.4.5. CONSTRUCTION OF THE MARINA

The Marina includes the Access Channel, Outer Marina and Inner Marina (also referred to as the canal). The Outer Marina is the main area of the marina, which includes the marina wall (breakwater), mooring area and access to the inner marina through the use of a crane.

The first stage of the construction works will be to construct the marina wall. This will be constructed from land to a level above high water. Trucks will deliver rocks to the site, which will be placed in the water by excavators and front-end-loaders, to a temporary crest height of +1.25m MSL. The Marina wall will function as a temporary construction platform where further work will be undertaken. See Figure 10 for graphical examples of how the wall will be constructed.

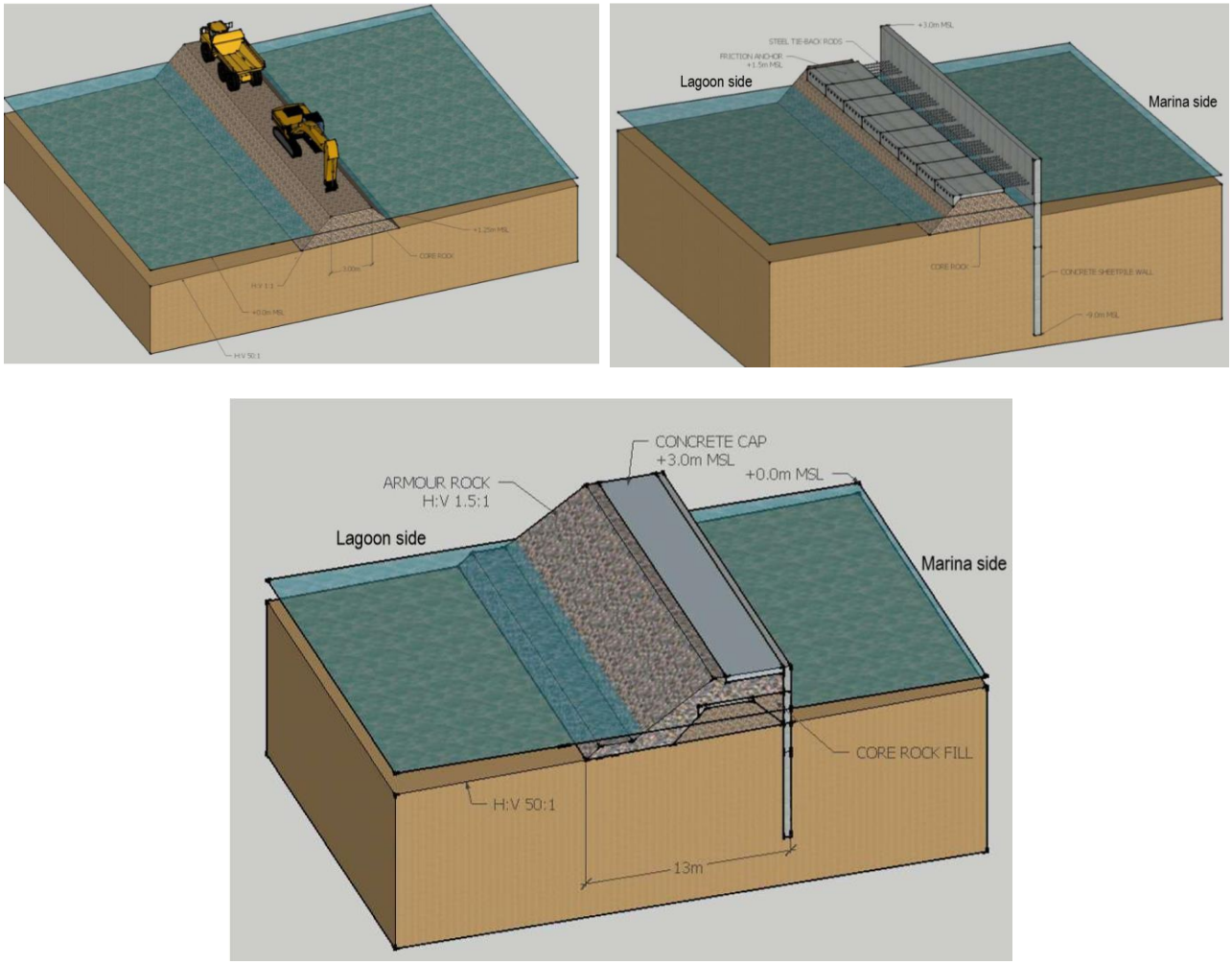


Figure 10 – Proposed construction methods of the marina wall

Construction of the vertical wall on the marina side will most likely be undertaken using vibrating sheet piles from land or from a barge, and lateral stability by means of tiebacks (anchor rods) will be provided. If piling is not suitable when further inspection is carried out, the Marina wall would be constructed using a bund and bringing in rocks on trucks that will be placed and levelled with a Back Actor (a piece of excavating equipment/digger), with concrete coping, either placed in as precast panels or cast in situ.

Vibratory pile driving will take approximately two weeks. The total construction of the breakwater wall will take an estimated timeframe of one month to complete. The final stages of the breakwater wall will be constructed by placing further rock material on the wall using 10-15 tonne dumper trucks for placing rock material, and an excavator will be used to spread the material.

Once the full length of the marina wall is constructed, the entrance to the Marina will be temporary closed using sheetpiles or rock allowing a construction bund to be developed. The natural easterly Lagoon access channel and the Marina Access Channel will then be dredged and pumped into the construction bund. The dredged material will build up in the construction bund, allowing sediments to flow out of the bund through the outgoing tide and back into the Bay area. Overflow pipes will be used where required. The dredged material will be removed by excavators and

front-end-loaders which will be on land, directly transferred to trucks and transported to Industrial Zone 14 (discussed more in section 4.7.11), where it will be used as fill material for future development.

Dredging (see next section for more detail) will be conducted using locally available dredging equipment and utilising a gravel dredge pump system (sized between 6-10 inch), utilising a slow, stop start approach, and will occur on the outgoing tide. The rate of backflow will not exceed the rate of pumping. Dredging activities and the construction of the marina wall, which includes piling will be for a short duration, approximately six months, however this may reduce if a different technology is utilised. Mr Alan Louw confirmed (Pers comms on 14th February 2018) dredging on the outgoing tide or into the construction bund, with monitoring would be suitable to ensure potential impacts of dredging are understood and managed. Dr Rob Simmons recommended that dredging should be undertaken in winter months, from May to August (Appendix H); however, the scheduling of the dredging works will be reviewed once a preferred technology has been identified.

Upon completion of these dredging activities, the Outer Marina will then be dredged and excavated to provide a basin. This will be undertaken from land or from the marina wall. Once the required depth is met, the marina wall will then be raised to the specific design level, armour rock and breakwater toe will be installed, and a concrete cap will be constructed, which involves pre-cast and/or in-situ cast concrete cantilever or block units. The temporary sheet piles and/or rock at the entrance will then be removed in order to flood the marina.

The Inner Marina will be constructed in two phases. The western half will be created in Phase 1 and the eastern section in Phase 2. The Inner Marina will be constructed through the use of sheet piles. These would be inserted into the ground creating an enclosed area that would then be excavated. The base would be prepared followed by the dewatering of the basin. The surface of the canal would be prepared, including the installation of any drainage or pumping systems. The floor and sides of the inner marina would be a reinforced concrete structure.

The Phase 1 and Phase 2 sections of the Inner Marina will be constructed independently. During Phase 1, the Inner Marina will be built beyond interface for Phase 2. A wall on the eastern side of the Phase 1 Inner Marina will be created. The second Phase will therefore be built independently of Phase 1. The interface wall will be demolished once the Phase is completed. Any concrete used to construct the Marina will be delivered by an agitator cement truck from Walvis Bay.

4.7.4.6. Dredging Activities

The gravel dredge reclamation system is designed to pump gravel and sediments in soft sea floors. Gravel pump systems employ vortex style pumps between 6 - 10 inches in diameters and are specifically capable of dealing with gravel and other harder material (Keene Engineering, 2018). The gravel dredge system is similar to that applied in the diamond mining application however on a far smaller scale.

Alternative dredging methods are currently being investigated, which may identify utilizing different technologies such as sucker dredgers or environmental dredgers suitable for dredging in shallow waters in sensitive environments. One of the options that has been identified through this review is 'Watermaster' or similar as detailed in Appendix N.

This type of dredging can dredge to a depth of 6.5m and is within the range required for the Outer Marina and Access channel. It is a non-intrusive technique as it does not require permanent footings on the sea floor and is capable to operate in shallow waters with two independent hydraulic pumps; one that operates the suction/vacuum action, the other that operates the cutter blade that feeds the material directly into the suction pump at the head of the dredger. This technology eliminates the need for an agitator pump that rapidly disturbs sediments to allow them to be sucked up with a dredge. Material would be vacuumed through the dredge head into a 220mm suction pipe that would be

directed into the construction bunded area and discharged into the bund with a lay flat hose that can be moved around the bund to allow even placement of material.

Due to the technology of the dredge machine there is the ability to control the sediment to a degree; therefore, this option provides the opportunity to dredge on both incoming and outgoing tides on the condition that turbidity thresholds are not exceeded. This option would permit dredged material to be repositioned on the outgoing tide in the Bay area and on the incoming tide material could be directed into the construction bunded area, thereby reducing construction time. This method reduces the amount of potential sediments in the water column and is therefore preferred technology.

Any dredging activities will be monitored through site surveillance by Mr Alan Louw, an extremely knowledgeable local expert on dredging. Mr Louw will be given the authority to stop and start dredging activities to prevent any potential impacts to the Lagoon. Turbidity monitoring will also be undertaken at specific locations in the Lagoon and Bay area.

4.7.4.7. Raft Structure and Integrity

The Raft restaurant is built on wooden piles. The Raft's structure requires an investigation to be able to determine its structural integrity. Visual observations indicate that some of the piles require maintenance and repair. The Marina construction will take place within close proximity to the Raft and therefore there is the potential that construction activities may impact the foundations. Qualified vibratory pile driving operators will be engaged to undertake this task and an assessment on the best approach to prevent harm or damage to the structure will be completed prior and during construction.

A pre-construction survey will be conducted and recorded, including a photographic report. This will be signed off by both the proponent and the owners of the Raft. If necessary, a pre-construction agreement will be drawn up with the owners of the Raft Restaurant.

4.7.5. Phase 2 Construction Activities

This section describes the construction activities for Phase 2. Various activities will be the same as Phase 1, and therefore is not repeated.

4.7.5.1. Relocation and Demolition of Existing Facilities

The cricket clubhouse would have been demolished in Phase 1, and replaced with a temporary facility on the western edge of the oval, until such time as the cricket field is relocated, when a new clubhouse will be constructed at the new location/site. The remaining works for this area in Phase 2 will be to strip the turf and relocate it for reuse on site in Kuiesbmond. This site may require some minor preparatory works prior to receiving the turf. A new cricket club house will be constructed which will take approximately three to six months.

4.7.5.2. Site Preparation and Re-routing Existing Services

The remaining existing services will be re-routed and connected to the re-routed services that occurred in Phase 1 and existing services. The same techniques will be utilised in this Phase.

4.7.5.3. Main Construction

The same construction activities, methods and similar construction plant and equipment for Phase 1 will be required for Phase 2. The construction office compound will be located on the Namport side of Phase 2 and the site will be accessed via Atlantic St.

4.7.6. Construction Lighting

Any lighting required during the construction stage will be to facilitate a safe working environment. Lighting will be downward and away from residential properties, and flood lighting will be minimised. Minimal lighting is envisaged to be required as construction works will be undertaken during daylight hours. The ESMP provides further details on lighting measures.

4.7.7. Traffic and Access Management

During all stages of construction, vehicles will access the site from the north side via Atlantic Street. Construction vehicles will be routed along 5th Road on to Atlantic Street thereby avoiding residential areas, specifically KR Thomas Street and 4th Road. Access to residential properties in the surrounding area and adjacent to the site will be maintained at all times. Waterfront Drive will be commissioned at the end of Phase 1 for public use. This main access route on to Waterfront Drive will be via Atlantic Street.

Traffic management and calming measures will be provided to aid traffic flow for both construction vehicles and public vehicles, control construction vehicles entering and existing the construction site, and maintain safety and minimise disruption on the local community. These measures may include:

- Flags and banks-men
- Signage
- Predetermined and signposted construction traffic routes

The Protea Hotel is currently accessed via Atlantic Street and The Esplanade. The Raft can only be accessed via pedestrian access off the Lagoon Promenade. The Esplanade and Lagoon Promenade will be closed in Phase 1. Access to the Protea Hotel will be via Atlantic Street, which will be appropriately signposted. The Raft will continue to be accessed via the Lagoon Promenade, however pedestrians will not be allowed between the Raft and the Protea Hotel along the Promenade and will be diverted via a slightly longer route. Pedestrian access will be supplied to the Raft as one of the first and critical steps in the marina construction phase.

4.7.8. Vehicle Types and Movements

Based on the schedule and type of activities, it is estimated that the proposed project will involve the following vehicle types:

- Bulk Earthworks
  - Two Excavators
  - Eight 8m^3 Tipper Trucks
  - Two 11 Ton Rollers Compactors
  - One Grader
  - Two Hilux Bakkies
  - One Fuel Trailer
- Building Construction
  - Two Backhoes Loaders
  - Two Skid steer loaders
  - Two Ride on rollers
  - Four Hilux Bakkies
  - Two Tipper Trucks
  - Piling rig and supporting crane
  - Tower cranes
- Hydraulic and pneumatic tools for small tasks;
- Marina Construction
  - Piling rig
  - 10-15 Tonne dump trucks
  - Excavator
  - Roller
- Dredging
  - One six / ten-inch gravel pump
  - Pipes
  - Excavator
  - Trucks for transporting material off site
- Road Upgrades:

- Grader
- Vibratory steel drum roller
- Bitumen sprayer
- Paver
- Roller
- Water truck

During construction, approximately 100,000m^3 (total material 78,000 (off-shore) plus 22,500 (on-shore, from the road reserve area) of material will be generated during dredging activities, which will require transfer off site. This material will be used as fill in the Industrial Zone 14 (see section 4.7.11). The material will be transported off site using trucks, which will require approximately 10,000 truck trips. Ten trucks will move the material over a six-month period, which equates to approximately 50 truck movements to and from the site per day.

These truck movements will be scheduled to avoid sensitive times, such as before 7am and after 6pm, rush hour and school runs. Traffic management measures such as banksmen will be utilised, and designated routes shall be used. Best practice measures will be applied to control dust generation and dispersal, for example dampening techniques, covering the material, and restricted speeds, as set out in the ESMPs (Appendix A).

Materials for construction will be delivered to site upon demand; stockpiling will be avoided where possible.

4.7.9. Road Network Upgrades

A traffic study was undertaken in November 2016 that modelled existing traffic conditions and future predicted flows for the proposed project. Through modelling and analysis, it was identified that some intersections and road sections may not have the required capacity to accommodate predicted traffic flows, therefore minor upgrades would be required

The upgrades will be limited to within the existing road boundary, with the majority of works being new road markings altering junction layouts (see the yellow pins in Figure 11), existing roads to be upgraded to dual roads (use of road markings, see purple and yellow lines in Figure 11), and traffic signals. Some minor works may be required such as the construction of a 6m wide median island along Nangolo Mbumba Drive to ensure safe turns into Esplanade Drive. Traffic calming measures such as speed humps may also be installed on the eastern side of KR Thomas Street and 4th Road to discourage road users accessing the propose project via these roads.

Figure 11 – Potential Road Upgrades

The current road surface conditions are considered to be suitable and do not need to be upgraded. The ESMP (Appendix A) includes monitoring measures to inspect the road surface during construction and operation.

4.7.10. Construction Material

Materials used to construct the proposed development will include the following:

- Locally sourced granite (tiles and/or slabs);
- Natural stone sourced locally;
- Aluminum and stainless steel;
- Roof aluminum sheeting
- Locally sourced cement;
- Timber;
- Locally sourced rocks and cobbles; and
- General construction material.

Materials will be brought to site as and when required, and stockpiling will be minimised.

4.7.11. Material Management: Dredged Material

Approximately 78,000m^3 of material will be dredged removed from off-shore (Outer Marina and Access Channel) and approximately 22,500m^3 will be excavated material from on-shore. This material will require disposal / relocation for reuse for other developments / projects. The disposal options for dredged and excavated material will be determined based on the analysis of the sediments. The identified preferred disposal area for the material is Industrial Zone 14 in an industrial area and would be used for the filling of land for industrial development (see Figure 12).

Figure 12- Industrial Zone 14 for the disposal of material

Industrial Zone 14 is less than 7km from the proposed site. It would be accessed via 5th Road, the D1986 and then the C14. The surrounding site is currently unoccupied and ear-marked for future industrial development by the IUSDF. To the north is Narraville, to the east is open land, to the south is bird sanctuary and to the west is an industrial area and the new mall.

4.7.12. Waste Management: General Construction Waste

The control and management of waste will be undertaken in accordance with the ESMP (Appendix A). A waste management plan will be developed before the start of works and will set out how building materials, and resulting waste, are to be managed. The Waste Management Plan will set out plans for materials, and waste minimisation and management in line with the waste hierarchy (avoid, reduce, reuse, recycle, recover, final disposal), and will include the following details: waste types, quantities, waste handling and disposal companies, and the identified disposal site.

Demolition activities will generate waste including bitumen, concrete, reinforced concrete, swimming pool infrastructure, structural steelwork, concrete and plastic pipework, rock and gravel materials, soil and potentially contaminated soil. These materials will be removed and transported off-site once sufficient volume has been collected, and transferred to an appropriate disposal site. Demolition of buildings and therefore associated waste is anticipated to be approximately 5,500m ^{3} - 7,500m^3. Other general construction waste will include packaging and waste timber or aluminium / steel, excavated material, with the potential for contaminated soil, and vegetation.

Through a site survey of the buildings to be demolished, asbestos has been found in the roof material of one building. The asbestos roof covers an area of approximately 20m^2. Due to the health risks associated with asbestos removal, the specialised task will be undertaken by a qualified asbestos removal contractor. The removal of this contaminated material will produce hazardous waste, which will be disposed of at the hazardous waste disposal site. Other hazardous waste could arise from potential hydrocarbon spills from operating plant and equipment.

Material excavated on-shore during Phase 1 in the location where the part of the Outer and Inner Marina will be located will be approximately 22,500m^3 (road reserve). This material will be tested which will determine the route for reuse (Industrial Zone 14) or disposal (dedicated hazardous waste facility in Walvis Bay).

4.7.13. Site Demobilisation

Upon completion of both Phases, the site will be cleared of all construction vehicles, plant and equipment and the site construction office compound will be removed. The removal will be done in a staged approach, and where plant and equipment are no longer used it will be removed from the site.

4.8 Consultation Feedback: Construction

Consultation feedback that has influenced the construction methodology includes the following:

- A traffic alternative will be provided for the closure of the Esplanade road near The Raft; and
- Access for patrons to the Raft restaurant will be maintained during construction.

4.9 Final Design and Operations

4.9.1. Operational Activities and Management

Walvis Bay Waterfront Properties (Pty) Ltd will be the management company for the proposed project. The day-to-day operations of the businesses will not be managed by Walvis Bay Waterfront Properties (Pty), for example, the operations of a restaurant, but rather by the business owner or appointed managers. Walvis Bay Waterfront Properties (Pty) Ltd will therefore, be responsible for the following:

- Care and maintenance of the marina and canal: dredging, flushing of the internal canal and regular monitoring;
- Ensuring compliance with Marina rules and regulations by all occupants (boats);
- Managing rental and levy finances for all occupants of the proposed project;
- Managing the distribution of profits;
- Undertaking regular communications with updates, news or other information to all occupants;
- Undertaking maintenance of utilities and services;
- Undertaking maintenance of open areas; and
- Managing and maintaining residential rental properties, including the serviced apartments.

4.9.2. Employment Opportunities

To manage the proposed project under Walvis Bay Waterfront Properties (Pty) Ltd, a trained workforce will be required which will include various roles for the standard operating activities associated with a development of this nature. A breakdown of employment is provided in Table 11.

Table 11 –Employment opportunities

EMPLOYMENT TYPE	APPROXIMATE NUMBER OF WORKERS
Waterfront Management Company:	
Management and supervisors (skilled)	15
Unskilled	50
Contract Staff	20
Residential properties:	

EMPLOYMENT TYPE	APPROXIMATE NUMBER OF WORKERS
Supervisors	2
Unskilled	120
Restaurants & Retail:	
Skilled and unskilled	935
Hotel & Serviced Apartments:	
Hotel 1	275
Hotel 2	145
Serviced apartments	45
Conference centre:	
Skilled and unskilled	70
Marina & Boat maintenance:	
Unskilled	35
Offices:	
Mall and Marina	35
Other:	
Other unskilled	55
Total	**1,800**

The above numbers are estimated using the number of hotel rooms, retail and restaurant space and predicted boat numbers. Indirect jobs will be created and affect downstream services in the Walvis Bay area. A conservative multiplier effect of two has been applied to determine potential indirect job opportunities. This has been derived from the professional teams' experience from other waterfront developments around the world, including the Victoria and Alfred Waterfront in Cape Town. It is estimated that between 3,400 and 3,600 indirect jobs will be created, therefore the development will generate between 5,000 and 5,300 jobs.

4.9.3. TRAFFIC

TRAFFIC

Estimates for trip generation were calculated for the proposed project (Appendix G), which were based on the Committee of Transport Officials trip data manual. The expected trips to be generated once the whole development is fully operational are illustrated in Table 12 (applying Scenario 8 in the Traffic Study, Appendix G).

Table 12 – Peak hour expected trips

PEAK HOUR	IN	OUT	TOTAL
Weekday AM	700	302	1,002
Weekday PM	890	1,292	2,182
Saturday Midday	1,057	999	2,055

4.9.4. Access and Parking

A total of 1,700 parking bays will be provided both above ground and at semi-basement level. The number of parking bays was influenced by the recommendations from the Traffic Study (Appendix G) and the Walvis Bay town planning scheme.

Walvis Bay town does not currently have an extensive public transport service; however, the Walvis Bay IUSDF (Walvis Bay Municipality, 2014) details future provisions for a public transport system linking the waterfront with the main town. The proposed project has therefore integrated facilities to cater for a public transport system, including a bus turning circle, bus parking and drop off zones south of the Protea Hotel, and bicycle parking and storage.

The following parking provisions are included in the design:

- Users of the marina area will have access to parking bays adjacent to the marina which is accessed from the Esplanade.
- Parking in the semi-basement for the commercial areas will be accessed off Atlantic Street via Waterfront Drive.
- Parking for retail business is six per 100m^2, which will be both above ground and semi-basement level.
- Parking for residential areas is both above and underground and will be accessed via Waterfront Drive and KR Thomas Street. Residential properties will have two parking spaces per property.
- The hotel next to Atlantic Street will have dedicated parking that will be accessed via Waterfront Drive and KR Thomas St.

Parking bays have been calculated using the Walvis Bay Town Planning Scheme requirement and have been over catered for by the proponent.

The waterfront will be signposted and will route traffic via Atlantic and 5th Street. Pedestrian access to The Raft will be via the breakwater wall, with parking at the end of the marina wall on Esplanade Drive. Parking for The Raft customers is provided within the parking calculations.

4.9.5. Lifespan, Care and Maintenance

The Walvis Bay Waterfront will be a permanent feature of the town of Walvis Bay. Traditional local materials which withstand the harsh coastal conditions will be used so that the buildings are structurally sound in 30-40 years' time, which should not require significant care and maintenance.

The architects have taken the micro-climate and it's harsh weather conditions into account and envisioned a design that would portray elements of both the Namib Desert and the Atlantic Ocean. Low-maintenance, robust materials are proposed for the exterior facades and public areas which will stand the test of time and will be more sustainable in the long run. Passive design and energy efficiency principles combined with the use of appropriate building materials are means in which to achieve a more sustainable development.

4.9.6. Architecture and Landscape Design

The layout of the buildings has been planned to keep in mind the Namibian population who enjoys the outdoors and spend a lot of time utilizing the Lagoons banks throughout the year. This characteristic gives way to propose an open occupation of the ground, and outward facing buildings. Restaurants, cafes, a multi-use auditorium and shops have easy and continuous access to the platform and the central heart.

The public area, which surrounds and connects the site to the Marina has been designed with terraces and subtle level changes, allowing pedestrians ideal places to relax and spend time, whilst the attractive views of the Lagoon and its wildlife are on show.

The final architectural design has been developed to take into consideration the surrounding environment to permit landscape features to be integrated into the design. The contemporary buildings will be made from locally sourced sustainable materials, such as granite, natural stone and cobbles, allowing the integration and blending into the surrounding environment. Granite will be used for floors, arcades, public areas and wall cladding; natural stone will be from the Namib Desert and will be used for building plinths, sea walls, public walkways and wall cladding; and natural hardwood timber structures will be used in public areas, walkways and restaurants. The soft landscaping will have palm trees, aloe trees, olive trees and grassy areas. The design is considered to take into consideration the recommendations set out in the SEA for the Coastal Areas of Erongo and Kunene Regions (DHI Water & Environment, 2007) - *"minimise their impact on the environment in terms of both resource utilisation and visual impact,"* and be *"designed in such a way that they are unobtrusive, environmentally sympathetic and, as far as possible, enhance rather than detract from the visual impression of the environment."*

As much construction material as possible will be obtained locally. Both the building and the Waterfront area are largely covered in naturally sourced stone, preferably from local quarries. The proposed project encourages the use of recycled materials such as the structural steel. Preferring the local industry promotes the local area and diminishes the materials' carbon footprint. Low embodied materials such as timber are largely proposed in the interiors.

The buildings have been set back from the coastline and the surrounding roads. Artistic impressions of the planed waterfront have been provided in Figure 14.

4.9.7. Marina Design

The Marina will accommodate berthing for approximately 70 boats, which has been determined by the design capacity and available space. Berthing will be limited to boats with a maximum draft that the Marina can safely accommodate, which could be between 3m and 5m. Moorings are provided through a series of floating jetties. In the Outer Marina, these will rise and fall with the tide and held in position by means of suitable guide piles or struts.

The Outer Marina and Access Channel have been designed to allow for the vessel draft, Lowest Astronomical Tide (LAT), keel clearance, and allowance for natural siltation. The water level in the Outer Marina is tidal and will thus rise and fall. The depth will be approximately -3.5m deep relative to MSL; therefore, at very low tide the Outer Marina will have a minimum depth of approximately -2.5m. The Outer Marina and Access Channel will require dredging to maintain a safe nautical depth. This will occur approximately every five and two years respectively. The Outer Marina is expected to have a natural circulation, however if required, engineering controls will be implemented to ensure the water is circulated sufficiently to avoid stagnant water and risk of algal blooms.

The Inner Marina will be a fixed water level. The floor of the Inner Marina will be made of impermeable base, i.e. cement and will have a depth of at least -3.5mMSL, and top of walls and gates to around +2.2mMSL. Boat access to the water body will be through the use of a crane. Vessels with a maximum draft of 1.5m will be limited to accessing the Inner Marina.

The environment of the Inner Marina is a closed waterbody, it will be artificial with limited sediments, flora or fauna. To ensure the water quality of the Inner Marina is managed and to reduce negative effects, pumps or oxygenation may be applied, and at certain conditions, water could be drained and the Inner Marina 'flushed'. During these 'flushing' periods, approximately 5,000m^3 (two Olympic swimming pools) of water shall be flushed out into the Bay

area. The method and approach to this activity will include measures that avoid impacts on the environment, for example, flushing will only occur on the outgoing tide; and Marina users will be notified early. The final management measures of the Inner Marina shall be determined through the operations phase when real conditions have been realised and the best approach can be established. Chemicals will not be used and the marina will be cleaned every so often to remove build-up of moss and other organisms. These operations will be included in the Operations ESMP (Appendix A).

4.9.8. Marina Operations

Approximately 70 boats are expected to be moored in the Marina. These boats will be of various sizes and will be restricted in size to those the marina has been designed to cater for (as described above); this will include leisure yachts and small recreational boats.

Boat operators using the marina will fall under the management of the proponent and therefore the proponent shall enforce strict rules and regulations for boat operators and users of the marina.

Education and notice boards shall be positioned around the Marina, displaying information regarding the code of conduct, rules and regulations of the Marina and other guidance to ensure impacts on the environment are minimised. This shall include but not limited to:

- No littering;
- No feeding of wild animals;
- Speed limits;
- No-go areas including the Lagoon;
- Compliance to Namport's nautical safety requirements;
- Compliance to National Water Safety rules and regulations;
- Safety requirements;
- No mooring outside of the Marina;
- Shut down of fish finding and boat sonar equipment when moored; and
- Rules regarding the use and limited use of lights on masks in the Marina.

Boats will only be permitted to use the Access Channel for entry and exit; this will be demarcated by buoys and access will be speed limit restricted.

Outside of the Marina and Access Channel, the proponent will have limited control over the boats users and their activities, however the proponent will reiterate that all users shall adhere to the following:

- Remain within areas approved for boat use and avoid restricted areas, including the Lagoon;
- Boats within the Bay area will fall under the regulations of Namport and all nautical safety requirements must be complied with, including national laws pertaining to boat use.
- A "Code of Conduct" will be drawn up and in place prior to operations setting out the rules and regulations of the Marina use.

4.9.9. Lighting Design

Natural lighting will be optimised in the proposed project which is both sustainable and a major energy-saving measure. A mixture of deep set windows, low glass and frost glazing on the facades provides several impacts: the white appearance; translucent shades and depth impacts; inverts the day-night manifestation of the building; but most importantly, provides positive internal daylight values. The depth plan is relatively narrow, proportioned to the

facade height in order to provide sufficient (+300 lumens) natural light to every corner. This is reinforced by square light wells in specific points of the building where the floor plan depth is greater than required, which is also repeated in the parking semi basement floors.

Lighting for the proposed project will be sensitive to the surrounding environment and includes downward facing lights and limited use of floods lights. Interior building lighting (for example the office area) will be fitted with sensors or timed lighting to reduce light pollution at night.

Within the Marina, boats that require lighting will be fitted with small less intrusive lights so not to disorientate birds. Energy efficient lighting will be incorporated into the design. The ESMP provides further details on lighting measures.

4.9.10. Bulk Services

Existing bulk services and infrastructure will be upgraded as part of the proposed project. The new sewerage system will be capable of handling 8,500m^3/day and will be connected to the existing sewerage distribution and wastewater treatment system, existing treatment facilities. The sewer lines will be a class nine PVC pipe, designed for transporting sewer waste, and pipes connecting to the surrounding areas will be a 200mm-diameter pipeline (Appendix L).

Fresh water will be provided through the existing municipality infrastructure, which is sourced from the Kuiseb Aquifer.

Electricity for the proposed project will be supplied by the Meersig Switching Station. The IUSDF allocated a projected electricity load for the proposed project of 1000 (kVA) and 4000 (kVA) for the yacht marina. The infrastructure networks in Walvis Bay have been built and continue to develop in accordance with the Walvis Bay IUSDF; therefore electricity projections for the proposed project have been catered for and accommodated in the Walvis Bay IUSDF.

4.9.11. Energy and Water Use

Building orientation is the single most important passive strategy for minimizing energy requirements. The proposed project organizes mostly elongated north-south volumes with shallow floor plates, leaving relatively neutral large East-West facades. This exposure contains Vertical Signage Facades & Pergola's where needed, a zone which benefits from deflected sunlight. The South facing nodes are designed to host the more public areas such as restaurant, offices and terrace which can benefit from sun exposure. On the opposite side, inward-facing buildings such as the auditorium, and mixed-use facilities are strategically located at the north-east end. Finally, the ground-level restaurants facing the Lagoon have an internal space and a summer external extension with sun-shading and wind protected screens and eaves to allow the visitors maximised connection to views.

Were feasible, renewable energy concepts have been incorporated into the design. The use of solar panels for energy generation is currently being investigated and optioneered, and water pumps embedded in the development will make use of wind power where feasible, which would be generated by small-scale wind circulation pumps inconspicuously incorporated into the design of the proposed project.

It is estimated that approximately 280 kl/day of water will be used across the development. Wherever possible water saving measures will be incorporated into the design, for example, the installation of duel flushing toilets, waterless urinals and further recycling water options will be investigated. Cold seawater will be used where possible to run the air conditioning units across the development, significantly reducing the water and power demand required for cooling buildings.

4.9.12. Drainage Design

The final development will have a permanent surface water drainage system that will consist of buried pipes and chambers, with various networks to cater for effluent water and surface water (rainwater). The design will take into consideration the surrounding properties and businesses, and any surface run-off shall be directed to the central drainage system, thereby avoiding impacts on surrounding areas.

Rainfall on the open car parks will be collected and routed through a surface water drainage system via oil interceptors before joining other rainwater collected from open areas and roofs. Rainwater will be collected across the site and reused within the development for soft landscaping. Should excessive rainwater occur that cannot be used on the site, it will be directed through pipework and discharged at various locations into the marine environment. The location and number of discharge points into the marine environment has been designed to discharge at controlled points at current runoff rates.

The semi-basement (which includes car parking) has an independent drainage system that is designed to ensure there is no interference with the shallow groundwater, this is a critical design consideration to ensure that seepage into the carpark area does not occur resulting in excessive pumping costs for the development.

The drainage system is gravitational and will not require the use of pumps. The system is designed to accommodate a 1 in 100-year event. All pollution preventions measures are specified in the ESMP (Appendix A).

4.9.13. Material and Waste Management

The proposed project will encourage recycling and waste reduction across the site through the use of waste separation bins. Tenants will be responsible for individual waste management within their buildings and shall comply with the Operations ESMP (See Appendix A). Guidance and rules will be provided for all owners and occupants, which will be binding.

A central waste collection point provides recycling and general waste separation facilities. Solid waste will be collected and incorporated into the Municipal Solid Waste Disposal System. Waste that is likely to be generated includes, but is not limited to:

- General household waste (glass, tins, packaging, food, paper) from residential properties, serviced apartments and hotels;
- Packaging from hotels, restaurants and commercial businesses;
- Food waste from hotels and restaurants;
- Hydrocarbon wastes such as oil and grease from fat traps from restaurants and hotels or from the marina;
- Bulk waste, such as redundant equipment, timber, metal etc.; and
- Garden waste.

Hydrocarbon waste is classified as hazardous waste, which includes fatty waste from restaurants and hotels. This will be collected via a standard designed wastewater system that includes the provisions for fat traps strategically located within the channels to prevent waste escaping the waterfront site and entering the Lagoon. The waste collected in these traps will be removed by registered waste removal contractors and disposed of to a suitable and registered disposal site, depending on the nature and quantity of the waste.

Hydrocarbon waste generated from the users of the marina may include small amounts of waste oil or fuel. This material will be collected in a safe and secure waste system designed into the Marina; this will be removed by

registered contractors. Other hazardous waste may include paints, paint tins, light bulbs, solvents, corrosion inhibitors and cleaners. Any hazardous waste will be disposed of to a dedicated hazardous waste site in Walvis Bay.

As part of the Operations ESMP (Appendix A), a Waste Management Plan will be produced prior to the operations phase commencing. This will include the following details: waste types, quantities, waste handling and disposal companies, and the identified disposal site.

4.9.14. Material Management: Dredging

As first mentioned in Section 4.9.14, maintenance dredging will be required to maintain safe nautical passage of boats through the Access Channel and into the Outer Marina. This will occur approximately every five and two years respectively. The site where the dredged material will be relocated to has not been finalised due to further information being required before an informed decision can be made, including but not limited to quantity and composition. Five options currently exist which are illustrated in Figure 13 and are discussed further in Section 5.6.

Figure 13 – Potential Sites to move dredged material during operations

4.9.15. Relocated Sporting Facilities

4.1.1.1 Swimming Pool

The swimming pool facility will accommodate a 7-lane, 25m length, indoor heated pool, with supporting facilities including a reception and small office, kiosk, seating / waiting area, ablution facilities and utility services. Provisions will also be made for future expansions to include another pool for diving/kids training pool, a gymnasium, a built-in viewing pavilion and a coffee shop.

4.1.1.2 TENNIS AND JUKSKEI COURTS

Two standard tennis courts with timber stands for spectators and a tennis clubhouse, and new jukskei grounds will be provided at the Jan Wilken site. There will be space for an addition of one tennis court if required in the future.

4.1.1.3 CRICKET OVAL

The new grass cricket oval and cricket pitch will be the same size as the current one on the proposed project site, new practice nets will be provided and a new cricket clubhouse with washing facilities will be provided.

4.9.16. CONSULTATION FEEDBACK: FINAL DESIGN AND OPERATIONS

Consultation feedback (full details in Chapter 9 and Appendix D) that has influenced the final design and operations of the proposed project include the following:

- The use of building materials that will tolerate Walvis Bay' harsh environment;
- Continuous pedestrian access from the Esplanade, through the waterfront, to the Protea hotel and the Yacht club;
- A designated space for informal vendors;
- Public spaces within the waterfront so people can enjoy the waterfront experience without having to spend money;
- A place for community events such as school performances and Galas;
- A business/conference centre;
- A place for people to go to enjoy the restaurant, wine and dine experience;
- An attractive waterfront environment with diverse activities and functions which will complement future development plans of Walvis Bay;
- A traffic alternative for the closure of the Esplanade road near the Raft;
- Adequate parking must be provided;
- Access for patrons to The Raft restaurant must be maintained during construction;
- The use of building materials that will tolerate Walvis Bay' harsh environment;
- Building heights adjusted and set back into the development to avoid blocking sunlight into neighbouring homes.

A series of artist impressions of the proposed project are presented in the following pages for illustrative purposes only, the reader should consider that the images presented might alter in reality as the design evolves.

ARTIST IMPRESSION

PHASE A - ISOMETRIC

Figure 14 - Isometric Artistic Impression

ARTIST IMPRESSION

MARINA PERSPECTIVE

Figure 15 - Marina Perspective Artistic Impression

ARTIST IMPRESSION

HOTEL / AMPITHEATRE PERSPECTIVE

Figure 16 - Hotel and Amphitheatre Perspective Artist Impression

Figure 17 – Marina Perspective

Figure 18 – Beach perspective

Figure 19 – View from potential offices

Figure 20 – Internal Canal

Figure 21 – Birds Eye View of the Marina

4.10 Potential for Additional Development

The IUSDF (Walvis Bay Municipality, 2014) allocates land in and around the town of Walvis Bay for future development. In the area surrounding the proposed project, land available for future development is restricted or has been allocated (see Sections 6.11 and 6.11.2 for more information on current and future development baseline). It is acknowledged that Namport have proposals in place to develop the area into a waterfront, which is currently occupied by restaurants including Anchors and the Yacht Club. Even though not considered as a committed development (see Section 6.11.2 for further information on the current and future developments of Namport), the design of the proposed project has considered the potential development and incorporated features such as pedestrian and cycle access routes, leaving the possibility of providing links and bringing the developments together in a holistic manner and creating a larger marine environment.

5 ALTERNATIVES & DESIGN EVOLUTION

5.1 INTRODUCTION

The proposed project has been subject to a process of design evolution, informed by both consultation and an iterative environmental assessment. As stipulated in the Environmental Management Act, 2007 and associated regulations, alternatives considered should be analysed and presented in the ESIA report. This requirement ensures that during the design evolution and decision-making process, potential environmental impacts, costs, and technical feasibility have been considered, which leads to the best option(s) being identified.

During design evolution of the proposed project, alternatives considered include site locations; site layout and configuration; and final design. In accordance with the EIA regulations, an analysis has also been undertaken to understand the implications of not having the development (non-development).

5.2 NON-DEVELOPMENT

5.2.1. STRATEGIC NON-DEVELOPMENT

Walvis Bay is a growing town and has been earmarked to become the leading industrial town in Namibia. By 2020, the Namibian Government, through the proposals set out in the 5th NDP (National Planning Commission, 2017) intend to increase processing rates in the fishing industry in Walvis Bay by 40%; increase the capacity of Walvis Bay Port by 65%; and increase national tourist numbers by 22%. As predicted by the Namibian Statistics Agency (Namibia Statistics Agency, 2011), the population will continue to increase and is expected to double by 2030. This economical, infrastructure and population growth will place pressure on local services and infrastructure, including available housing and community and tourism facilities.

The 5th NDP (National Planning Commission, 2017) identified that infrastructure and variability to support tourism growth is lacking across Namibia. The Plan therefore sets out objectives to improve infrastructure and diversify products so that tourism targets can be achieved. In Walvis Bay, there are currently no other formal committed developments similar to the proposed project that will support achieving the Government targets.

The proposed project therefore plays an integral part in supporting the growth of Walvis Bay. Without it, the growth of the economy and tourism industry may be limited: tourist numbers and retention will remain as is; new jobs will not be created; and the pressure on housing will continue.

5.2.2. PROPOSED PROJECT SITE NON-DEVELOPMENT

The Walvis Bay IUSDF (Walvis Bay Municipality, 2014), funded by the European Union and undertaken by an independent company, Urban Dynamics, Africa, presents the proposals and plans on how Walvis Bay will grow, allocating land for various development schemes taking into consideration population growth and certain thresholds/requirements (e.g. residential area per person) to identify the required land for certain developments. Marine development has been allocated on the area of land which is currently occupied by Yacht and Angling clubs, Municipality pool, tennis courts and cricket field (see Figure 22).

The southern area is the preferred area for the proposed project; the reasons why are discussed later in this Chapter. A cricket oval, swimming pool, tennis and jukskei courts currently occupy the site. These facilities do not fully optimise the available land; are not in the best condition, in particular, the cricket clubhouse; and are not fully utilised by the community. There is an opportunity to improve these facilities and generate social and economic value to the Walvis Bay area.

Leaving the site in its current state will not support the proposals set out in the IUSDF or bring economic benefits to the area through increased tourist numbers; tourist retention; and employment. New and improved facilities to

replace the currently existing ones will not be developed and therefore other communities around Walvis Bay will not benefit.

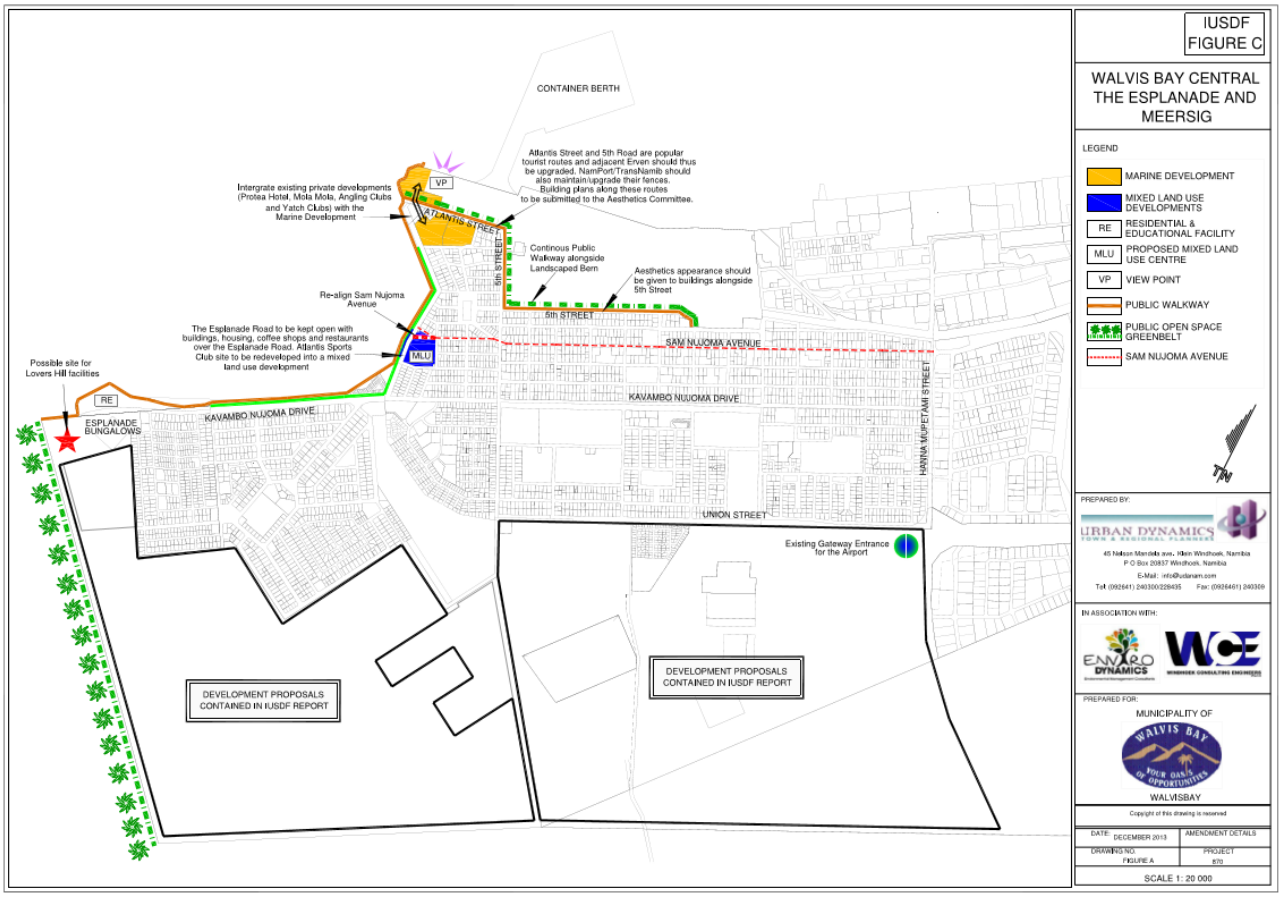


Figure 22 – IUSDF Waterfront Development locations [source IUSDF]

In addition, not proceeding with the proposed project is likely to leave the existing sewerage infrastructure in its currently under designed state, until further capital can be raised or injected into the Municipality. A project such as this one often has positive multiplier knock-on impacts for the surrounding residents and improvements to services such as sewerage and water supply.

5.2.3. Strategic Siting

Although the IUSDF identified areas for a marine development, an independent review has been undertaken to compare other potentially suitable sites/areas and determine whether or not the proposed project site is the optimum site.

Walvis Bay is 30km south of Swakopmund. The coastline between Walvis Bay and Swakopmund is open to the Atlantic Sea with a Dune belt running parallel to the coastline. Small residential areas have developed along this coastline. The development of Walvis Bay town was focussed around the Harbour area and has subsequently grown inland, which has been limited to geographical features such as the Lagoon and dunes. The town is well developed, with only small pockets of undeveloped land. Available land along the coastline is fully optimised in the Harbour area; the Namport Container Expansion project is currently underway to accommodate the lack of available space for port operations, and a second port terminal to the north is earmarked in the IUSDF. The developed Lagoon front is mostly taken up by residential properties and hotels/guesthouses.

Urban development along the coastline is limited to upmarket residential developments, aquaculture, eco-tourism and recreational related developments. Taking into consideration no development zones, conservation areas and other zones areas defined in the IUSDF, several potential areas/sites were identified, as illustrated in Figure 23. A summary of a high-level comparison is presented in Table 13. This has not analysed the environmental impacts but identifies certain features that would influence the decision making and comparison.

Figure 23 – Strategic Siting Site locations

Table 13 – Strategic Site options

SITE/AREA	ADVANTAGES	DISADVANTAGES
SITE A: IUSDF Marine Development Area (the proposed project site)	• Identified in the IUSDF for Marine development • In the Bay area, therefore protected from the Atlantic harsh conditions • On the mouth of the Lagoon and not in the Lagoon. • Compliant with the SEA for Coastal Areas of the Erongo and Kunene Region (DHI Water & Environment, 2007) • Provides accessible community facilities to local residents • Provides tourist facilities to those entering and exiting the Port of Walvis Bay	• Utilised site (although under-utilised) • On the periphery of the Ramsar designated site

SITE/AREA	ADVANTAGES	DISADVANTAGES
SITE B: North of the second terminal, south of Aphrodite Beach	• Within the Bay area, therefore protection from the Atlantic Ocean • Compliant with the SEA for coastal areas of the Erongo and Kunene Region (DHI Water & Environment, 2007) • Positioned away from the Lagoon	• No current access • The area between Swakopmund and Walvis Bay is designated as an Important Bird Area (Birdlife International, 2018) (see Section 6.1.2.16 for more information on IBAs) • The area is not close to the Walvis Bay Town and other facilities • Not accessible to local residents (walking or biking distance)
SITE C: Coastal area north of Walvis Bay: Area for upmarket housing and recreational activities, north of Long Beach **SITE D: Coastal area north of Walvis Bay: area for upmarket housing, north of Bird Island, south of Aphrodite Beach**	• Potential areas identified in the IUSDF. • Compliant with the SEA for coastal areas of the Erongo and Kunene Region (DHI Water & Environment, 2007) • Access from the B2 • Positioned away from the Lagoon	• The area between Swakopmund and Walvis Bay is designated as an Important Bird Area (Birdlife International, 2018) • The area is not close to the Walvis Bay Town and other facilities • Not accessible to local residents (walking or biking distance)
SITE E: Unoccupied site halfway down the Esplanade	• On the Lagoon front providing accessible community facilities • In the Bay area, therefore protected from the Atlantic harsh conditions	• In the Lagoon and Ramsar site • Limited boat accessibility • Atlantis sports club to be relocated in order to accommodate the planned mix land use development on the site (IUSDF)
SITE F: End of the Esplanade / South of Lagoon past the existing residential area	• On the Lagoon front providing accessible community facilities • In the Bay area, therefore protected from the Atlantic harsh conditions	• In the Lagoon and Ramsar site • Limited boat accessibility

The review of alternative strategic sites/areas for the proposed project concluded that all potential alternative sites/areas do not perform as well as the areas identified in the IUSDF, the current site.

5.3 WATERFRONT ALTERNATIVE SITE LOCATIONS

As discussed earlier, an area was allocated for marine or waterfront development in the IUSDF (the 'northern area' and 'southern area'); Figure 24 illustrates this area in more detail (Walvis Bay Municipality, 2014). As clearly stated in the IUSDF, the waterfront development was not a new proposal identified by the development framework; it had been earmarked as a potential development site for some time. The project was intended to be a joint venture between the two landowners (Namport and the Municipality), which initiated around 2008. An agreement between the two landowners, therefore a joint venture was never formally established.

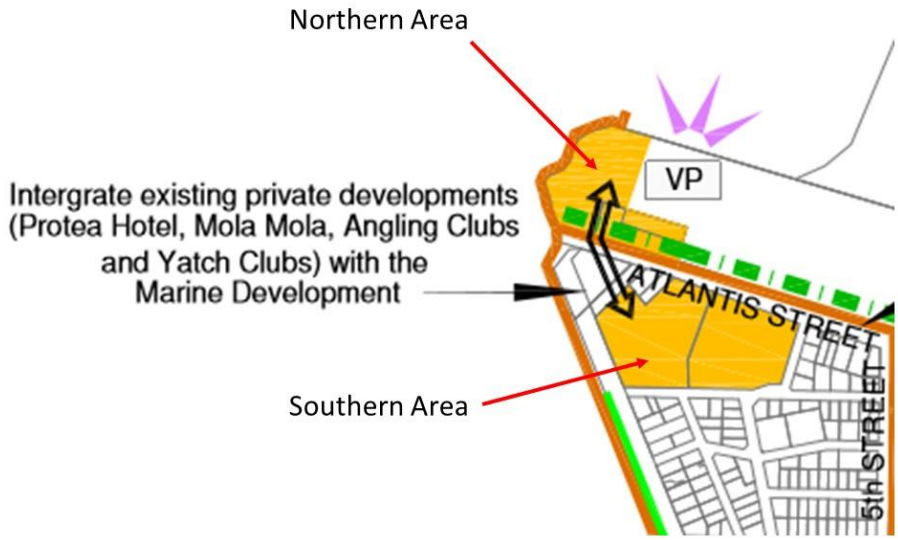


Figure 24 – Northern and Southern areas identified in the IUSDF

5.3.1. NORTHERN AREA

As illustrated in the first Namport Annual Report (Namport , 2013), Namport progressed with developing a marine development within their ownership (the 'northern area'). Between 2004 and 2014, feasibility studies followed by preliminary designs were progressed (see Figure 25). Several preliminary designs were drafted, taking into consideration environmental issues, financial feasibility, technical restrictions as well as informal stakeholder feedback. Since then, little progress has been made. Section 6.11.2.2 provides further details on this site.

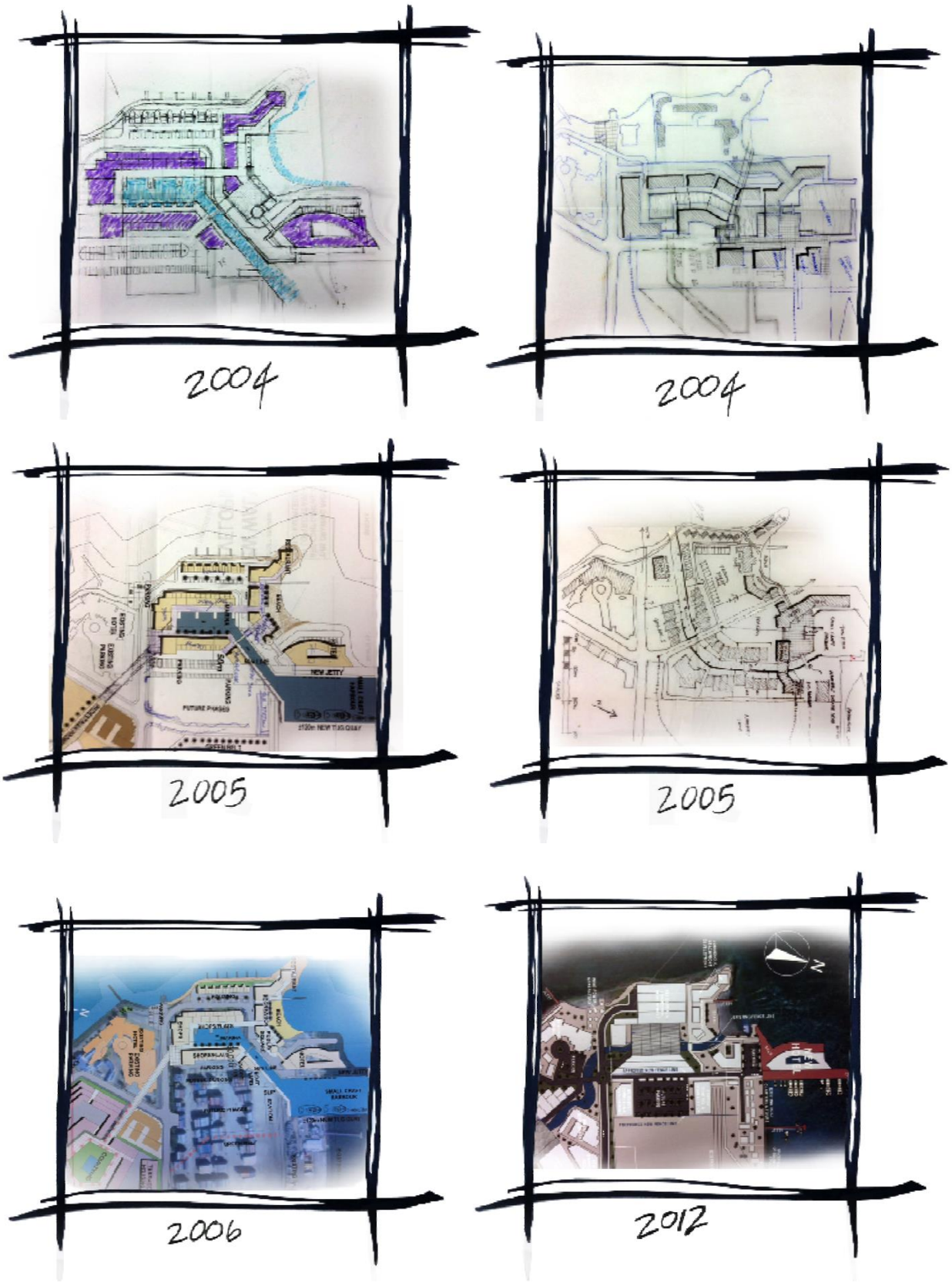


Figure 25 - Alternative Design Considerations for the Northern Area

5.3.2. SOUTHERN AREA

At around the same time (2008), Afrikuumba approached the Municipality with proposals to develop the area of land owned by the Municipality (termed the 'southern site'). Afrikuumba continued engaging Namport with the proposal to progress both sites simultaneously, however, due to limited responses from Namport, the Municipality and Afrikuumba combined to form a Joint Venture, formally establishing in December 2013 (shares certificate were issued January 2014) to ensure development plans continued. This joint venture established in line with the Local Authorities Act, 1992 as amended, and consultation and feedback from the community on the Public Private Partnership between the Municipality and Afrikuumba was obtained.

Between January 2014 and the end of 2016, various administrative tasks were undertaken to drive the proposed project forwards, for example, property rights and obtaining titles for transfer to the joint venture company, and obtaining minister approval for the development. At the same time, designs evolved taking into consideration lessons learned from the northern area (similar design principals were applied, however, certain elements had to be reconfigured due to the difference in the coastal features). Figure 26 provides examples of alternative layouts.

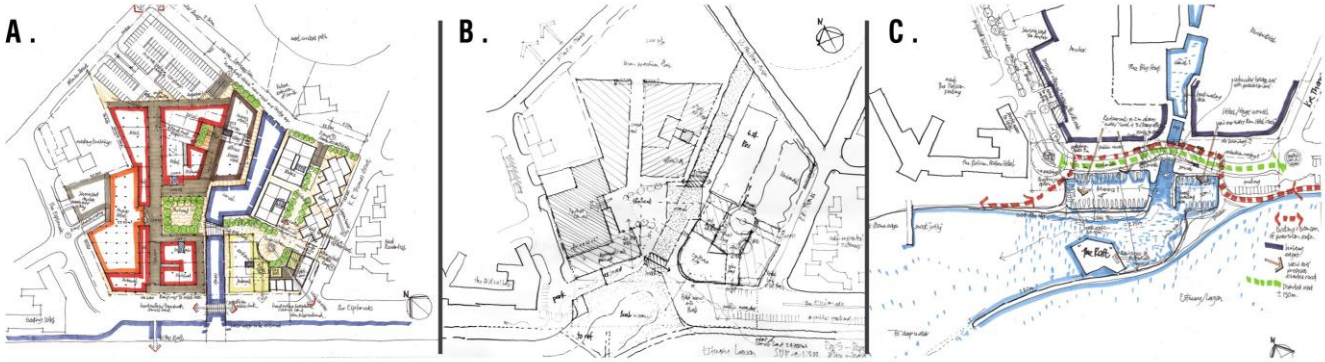


Figure 26 – Alternative arrangements

5.4 EARLY DESIGNS

During consultation with MFMR, it was identified that the proponent should consider the proposed project without the Marina option. The proponent took onboard this feedback and assessed and considered this option (see Figure 27), however, the findings from this review demonstrated that a waterfront development without a Marina would not warrant the project feasible; it would not technically constitute a marina/waterfront development as it would be set back from the coastline, nor would it provide potential tourist amenities and facilities. This option was therefore not taken further in the design development process.

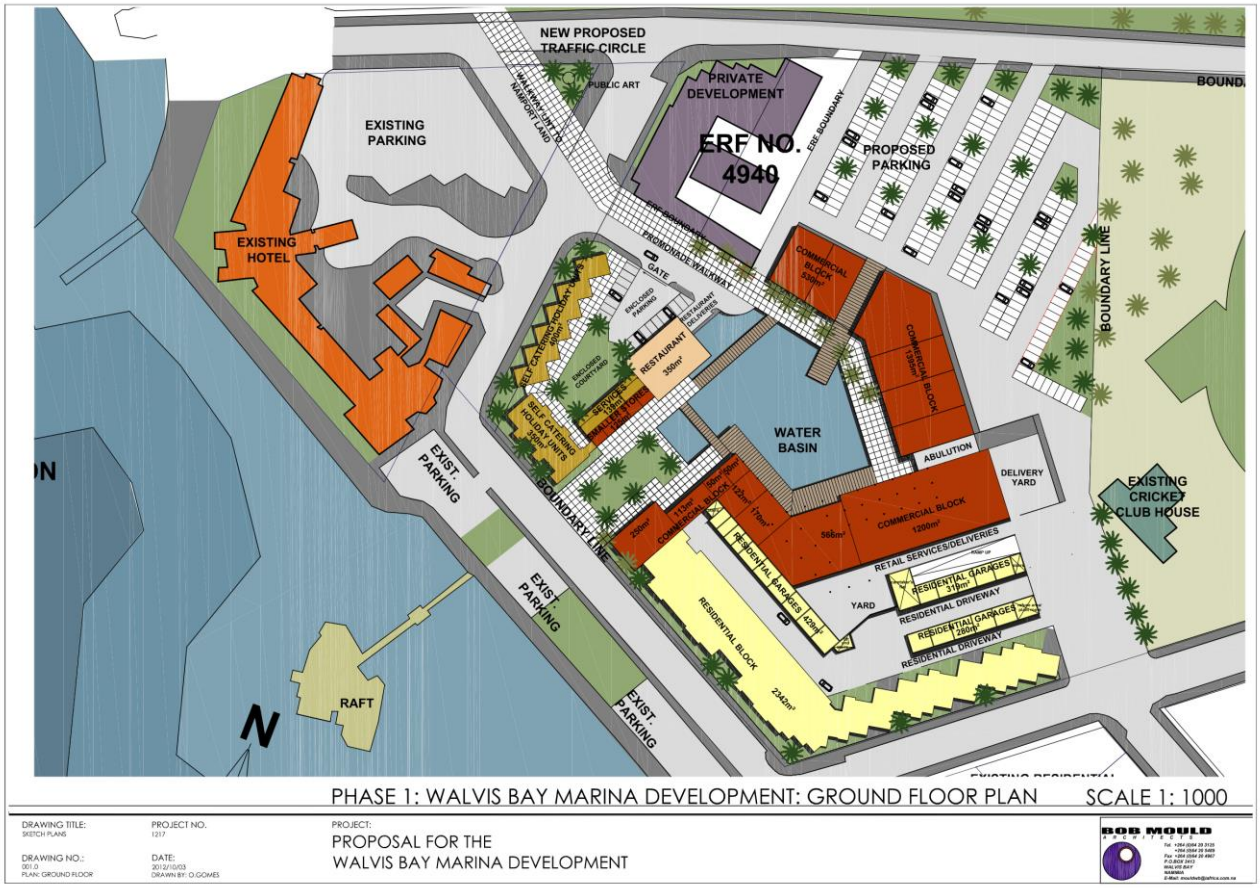


Figure 27 – Design option without marina

5.5 Detailed Design: Proposed Project Site Layout

The preferred proposed project design is a combination of both marine and land-based development components. A series of detailed designs were produced for the different development components to ensure the optimum design was identified. The design process was an iterative process: the ESIA team were commissioning in early 2017 and were directly consulted with at key stages so that designs could be reviewed; several specialists were brought in to ensure certain receptors and issues were considered and boat users were presented with designs to ensure the design was user-friendly. Various design changes were made as a result of feedback and advice provided by the specialists. Each of these components is discussed in this section.

5.4.1. Outer Marina Layout and Orientation

The Outer Marina component is the central component of the proposed project, as this influences the layout and orientation of all other development components. It is not only sensitive to the surrounding environment, but it could also cause the most damage to the environment. Careful consideration of this development component was therefore required, which involved using the hydrodynamic model, specific engagement with the avian specialist and hydrodynamics' specialist.

The key element of designing the Outer Marina was the marina wall. Various options of differing orientation, length and breadth were considered, as seen in Figure 28, which led to alternative layouts of the Outer Marina. Depending on the layout of the Outer Marina, other features such as the number of mooring areas, water locking systems, and internal beaches were also considered.

Figure 28 – Examples of Outer Marina Alternatives Considered

The key environmental issues that were acknowledged during this design stage were the potential impacts on the natural circulation of the Bay and Lagoon waters; reduce flushing impacts and increase sedimentation in the Lagoon leading to impacts on birds and sea mammals; and land taken (including the Ramsar site).

Taking onboard lessons learned through the design evolution of the marina wall and subsequently the Outer Marina, the preferred design remains in keeping with the natural features of the coastline: new land or infrastructure extending into the Lagoon is minimised and the Outer Marina that is not exposed / open to the Lagoon. The preferred option has a marina wall that runs parallel to the coast and is limited in length. The Raft Restaurant is sited on the outside of the marina wall, thereby reducing the total footprint area of the Outer Marine in the Lagoon. The Outer Marina is accessed from the north through a narrow but short access channel. These design elements avoid interference with the main deep-water channel and allow for continued flushing of the Lagoon.

5.4.2. Inner Marina

One of the design principals of the proposed project was to provide a waterfront development and a setting, both coastal and inland, for restaurants, hotels, residential and other facilities. An Inner Marina connecting to the Outer Marina was, therefore, a component considered from the beginning of the design process. It needed to have an integrated locking system so that the water level could be controlled and unaffected by the natural tides.

The design of the Inner Marina, including the locking system, length, and width, evolved through the design process.

Two design options were conceptualized towards determining the most feasible solution for the locked system:

- **Option 1:** Semi-Tidal Water Body. The inner basin is designed to function similarly to a tidal pool, where the minimum design water level is fixed and the maximum water level varies according to the upper tidal cycle. This system would be controlled through means such as a Lock System, which would allow the movement of boats into and out of the Inner Marina.

- **Option 2**: Perched Water Body. The water level of the inner basin is maintained at a fixed design level (level attained by pumping) and circulation is achieved by means of an operational pumping scheme. The Inner Marina would be a closed system, and boats would be moved in and out of the Inner Marina by means of a Davit/Derrick Crane for example.

The preferred option taken forward to detail design was Option 2. Option 2 would be significantly cheaper to operate than Option 1; a constant level would be required to allow boats to use the Inner Marina (tide would vary 2m which is greater than the proposed depth of the Inner Marina); and the Inner Marina would be more visually appealing when full.

5.4.3. Orientation and Layout of Buildings

The configuration of the development has incorporated many alternatives responding to the feedback received by neighbouring residents, for example, retail, restaurants and bars have has been positioned inwards of the development so 'residential' abuts existing 'residential'.

The setting of buildings was also considered including the potential blocking of sunlight on to locale residential properties and the heights of buildings and blending the development with surrounding buildings.

5.6 Operations Detailed Design: Dredging Alternatives

Sediment will accumulate in the base of the Outer Marina and Access Channel over time and therefore maintenance dredging will occur every two and five years respectively to ensure the access remains open and the required depths are maintained. Five potential sites have been identified for the relocation of the dredged material, as illustrated in Figure 29. The preferred location has yet to be identified and will be prior to the completion of the construction phase once more information and data has been obtained, for example, estimated quantity and composition. ECC will support the decision making to ensure the best practicable environmental option is identified and any potential risks or issues appropriately mitigated or managed. A preliminary review of these options is provided in Table 14.

Figure 29 – Potential site options to move the dredged material

Table 14 – Comparison of potential sites for the relocation of dredged material during operations

SITE OPTION	DESCRIPTION	ADVANTAGES	DISADVANTAGES
A: Lagoon Channel into the outgoing tide.	Sediment material could be collected by a floating dredge and discharged via a pipe into the outward flowing tide via the exit channel of the Lagoon. Discharge on the outgoing tide would allow sediments to resettle naturally in the wider bay area with the outward flowing tide.	✓ Cost-effective ✓ Use of natural repositioning of material ✓ Relocates sediment out of the Lagoon and back into the bay area	× Potential impacts to mariculture farmers, monitoring prior must be enforced × To a degree, this method is uncontrolled as the deposition of sediments is dependent on the tidal flow × If poorly managed sediment might end up back in the Lagoon × Not seen as best practice
B: On land on the sand bank west of the Lagoon mouth	Sediment material would be collected by a floating dredge, transported via a floating pipe then discharged on land, west of the mouth of the Lagoon. Once on land a small non-invasive piece of plant will be used to spread the material evenly on the surface.	✓ Cost effective ✓ May provide alternative habitat and food for birds and mammals ✓ Floating pipe non-intrusive method •	× Potential to disturb birds and mammals (seals) using the land × Potential for visual impacts × Introduction of mechanical equipment to a new area of the Lagoon × Not seen as good practice
C: Namport disposal site	Sediment material would be collected by a floating dredge and is transported to the Namport disposal site via barge/boat. Surplus dredge volume would be disposed of at an approved off-shore dumping site (located NNE of Pelican Point) in a manner defined by (Namport, 2006)	✓ Known disposal site ✓ Level of adaption likely to already be in place due to historic disposal ✓ Controlled location for dredged material disposal ✓ Seen as best practice	× Very cost intensive for anticipated small-scale dredging
D: Donkey Bay Area	Sediment material would be collected by a floating dredge and is transported to an area of the Walvis Bay Peninsula via barge/boat.	✓ Suggested site in line with the Climate Change adaptation report to build the area up to prevent a potential breach ✓ Resource for peninsula protections	× Cost prohibitive and small volumes therefore might not have the desired result × May negatively impact visual amenity × May impact birds and mammals
E: On land re-positioning of material	Sediment material would be collected by a floating dredge, transferred to trucks and transported to an onshore site. A site would have to be identified on land that can be used as the catchment area for the pumped sediment	✓ Provides a resource to the town to allow growth and development	× Cost intensive × Lack or limited land available for the onsite collection of material to be dried prior to transport × Increased transport and therefore noise or dust effects × Potential community severance issues

5.7 CONSTRUCTION METHODS

Several options for the design of the Outer Marina Wall were reviewed due to the potentially invasive construction techniques in the marine environment. The avoidance of piling was considered, however, was not deemed appropriate as piling was needed to reduce land take of the design of Marina Wall and optimise available space in the Outer Marina allowing it to be commercially feasible.

Hammer pile driving was considered, however, due to the nature of this technique being loud and potentially causing adverse impacts on marine mammals and other marine life, vibratory pile driving was considered more appropriate and would cause fewer impacts.

5.8 SPORTING FACILITY RELOCATION

The existing sporting facilities will be relocated to other sites in Walvis Bay. The relocation of these facilities has been carefully investigated based on consideration of the IUSDF (National Planning Commission, 2017) and consultation feedback from the public, current users and potential new users (new location). The agreement with the Municipality is that the sports facilities will be of an equal standard, as a minimum, and will be provided at a mutually agreed alternative location(s). Alternative sites for the relocation of the sporting facilities were presented to and discussed with the Walvis Bay Municipality. Sites considered unsuitable have not been included in this report.

Alternatives considered during design development were:

- Non-development: Development of the proposed project with no replacement or relocation of the existing sporting facilities;
- No-relocation: Integrate all or some of the existing facilities into the proposed project;
- Partial relocation: Integrate one or two facilities into the proposed project and relocate others; and
- Relocate all facilities: Relocate all facilities to other sites.

A summary of the decision-making is summarised in Table 15.

Table 15 – Alternatives considered for the sport facilities

OPTION	ADVANTAGES	DISADVANTAGES
Non-Development	Reduced costs (not additional development) Less disruption in other areas (less construction works)	Loss of community facilities, social impacts. Reliance upon and overuse of existing facilities (SPARTA), which will result in over-utilisation. Loss of green space
No relocation	Community does not loose facilities and gains better ones.	Some communities benefit from new facilities which are currently not in close proximity Less land available for tourist, commercial or residential use Less economical
Partial relocation	Community does not loose facilities and gains better ones. Less land take (for the project)	Other communities do not benefit from the new facilities which are currently not in close proximity Less land available for tourist, commercial or residential use Less economical
Full relocation:		
Cricket Pitch: Kuisebmond	Area does not have a cricket field The majority of cricketers are the younger generation; this area has a high population of potential users. Less travelling for users A legacy benefit to a less affluent area	Community loses sporting facilities
Tennis and jukskei courts: Incorporated into Jan Wilken Stadium	New and improved facility, improving a sporting venue	Community loses sporting facilities
Swimming Pool: Incorporated into Jan Wilken Stadium	New and improved facility (indoor heated pool), improving a sporting venue Improved economic return for the Municipality	Community loses sporting facilities Increased price for use of a facility

6 ENVIRONMENTAL AND SOCIAL BASELINE

6.1 BASELINE DATA COLLECTION

The identification of the existing environmental conditions that may be affected by the proposed project was collated through a number of methods: site walk-overs; field surveys, desk-top studies; consultations with stakeholders (local authorities and environmental specialists); and door to door engagement with neighbouring residents.

The environmental and social topics that may be affected by the proposed project is described in this section. The baseline focuses on receptors which could be affected by the proposed project and is limited to a study area which is discussed in section 3.2.4.

6.2 FIELD SURVEYS

6.2.1 SITE WALK-OVER

A site walk over was undertaken by ECC and the proponent on the 17th February 2017. A summary is provided below:

- The proponent provided an overview of the proposed project and a walk over of the site and surroundings was undertaken;
- The existing facilities were inspected including the pool, cricket field, tennis and juskies courts;
- ECC studied the site and surrounding environment, including walking along the neighbouring streets;
- Key observations included the location and proximity of residential properties to the site; vegetation on the site namely the large palm trees and municipal gardens; and species for relocation were identified.

Site visits were undertaken as part of surveys and assessments:

- 24th May 2017 – Bathymetry Survey
- 11th and 12th June 2017 – Site Walk Over with Dr. Rob Simmons
- 9th November 2017 – Site assessment with Mr. Peter Bridgeford
- 10th November 2017 – Site Assessment with Mr. Alan Louw

Towards the end of the assessment process, a further site visit was undertaken by ECC on the 10th December 2017, the aim of which was to reaffirm the assessment findings and close out any issues.

6.2.2 BATHYMETRIC SURVEY

A bathymetry survey of the Lagoon was completed by Strydom and Associates Surveyors for ECC in May 2017 to determine the marine floor conditions, access channel and sediment within the area that could be affected by the proposed project. The results of the bathymetry survey are included as Appendix F.

6.2.3 TRAFFIC IMPACT ASSESSMENT

A traffic impact assessment was conducted by Innovative Transport Solutions (ITS) Cape Town. The study undertook a traffic count of certain roads in the locality of the proposed project site and modelled ten scenarios. The model was then used to assess the potential impacts on the surrounding road infrastructure, including future capacity requirements of roads, intersections and junctions. Several mitigation requirements were identified. The study is included in Appendix G.

6.3 SPECIALIST STUDIES

Specialist studies were commissioned for topics that are considered important to the project due to the potential impacts on certain receptors. These are set out as follows.

6.3.1 AVIFAUNA STUDY

To understand the potential impacts on the important birdlife of Walvis Bay Lagoon area and potential implications on the Ramsar site, an Avifauna Study was commissioned in 2017. Dr. Rob Simmons, a renowned and respected expert on bird life specifically in the Walvis Bay Lagoon area has been involved in collecting data over the last 30 years. Dr. Simmons collated various data sets to establish a robust baseline and assessed the potential impacts on the avifauna from the construction and operation of the proposed waterfront development. Potential mitigation measures and alternatives were identified, which were recommended to the project designers. This report is included as Appendix H.

6.3.2 HYDRODYNAMIC STUDY

A hydrodynamic study was undertaken in 2017 by Delta Marine Consultants (DMC) to assess the potential impacts from the proposed marina as part of waterfront development. The study collated bathymetric data from the survey undertaken in 2017, NAMPORT surveys (2009) and the Local Agenda 21 Project (2002). The study applied the same modelling and assessment methodology as that used for the port extension project in Walvis Bay. Modelling was undertaken followed by an assessment of potential impacts. The study is included as Appendix I.

6.3.3 MARINE MAMMAL STUDY

The proposed project will require construction work within the marine environment, therefore Dr. Amanda J. Rau was commissioned to undertake a Marine Mammal Study to establish a baseline, undertake an assessment of the potential impacts of the proposed project and identify suitable mitigation measures. The baseline was collected through a desk-based study using available information, including data published by the Namibian Dolphin Project, and professional judgement. The study is included as Appendix J.

6.3.4 SUN AND HEIGHT STUDY

Sun and height studies were conducted by Bob Mould and Scheffer Architects to investigate the potential impacts the proposed Waterfront buildings may have on the neighbouring residential houses. The results of the sunlight and height studies are included as Appendix K.

6.4 DESK-TOP STUDIES AND LITERATURE REVIEW

A desk-top study was undertaken to review a range of sources of information, the details of which are provided below. The major sources include several environmental studies conducted for the Walvis Bay area, including impact assessments conducted for the Walvis Bay municipally and Namport.

- Walvis Bay Biodiversity Report (2008) (Walvis Bay, 2008): Provides an overview of the biological components of the areas surrounding and including Walvis Bay.
- Atlas of Namibia (Mendelsohn, 2003): Provides general environmental and social information for Namibia.
- Google Earth: Used to produce figures, understand the town layout, and identify potential social and economic receptors.
- Between the Atlantic and the Namib, An Environmental History of Walvis Bay (Silverman, 2001): Provides an overview of the environment around Walvis Bay and a detailed history from when the town was first colonised.
- Namport EIA Report (Delta Marine Consultants, 2010) and associated specialist studies: An EIA undertaken in 2010 to identify the potential effects from the proposed expansion container terminal.

- Erongo Regional Council Website (Erongo Regional Council, 2017): Information obtained on transport, economy and tourism.
- EIA Report for the Kuiseb Delta and Dune Belt Areas (Risk Based Solutions, 2012): An EIA undertaken in 2012 to identify the carrying capacity of the Kuiseb Delta and Dune Belt Area for community based tourism and other activities.
- Walvis Bay Integrated Urban Spatial Development Framework (Walvis Bay Municipality, 2014): A document which sets out the proposed project strategy for the town.
- NDP (National Planning Commission, 2017): Provides an overview of the proposed target industries to develop Namibia's economy.
- Namibia 2011 Population and Housing Census Report and Namibia Population Projection 2011 – 2041 Report (Namibia Statistics Agency, 2011) (Namibia Statistics Agency, 2011): Provide information on population growth rates and projections for the next 30 years.
- Ministry of Environment and Tourism Tourist Statistical Report 2015 (Ministry of Environment and Tourism, 2015), and National Tourism Investment Profile and Promotion Strategy 2016 – 2026 (Ministry of Environment and Tourism, 2016): Provides statistics on previous tourist numbers and types, and strategy for the growth of the tourism industry.
- Intergovernmental Panel on Climate Change Synthesis Report (Intergovernmental Panel on Climate Change, 2007): Provides information on climate change projections and potential effects.
- Building Climate Resilience, A Handbook for Walvis Bay Municipality (J. Josefsson, 2012): Provides detail on the potential impacts and effects of climate change, and proposals to avoid and mitigate these effects.
- Walvis Bay, Namibia: a key wetland for waders and other coastal birds in southern Africa (Wearne. K and Underhilll L. G, 2005): Holds valuable data and evaluates the status of the complex wetlands and their significance for waders and other coastal birds. The data has been reviewed and reanalysed, combined with data from Sandwich Harbour Data and some sophistical statistics, and published in the journal of Conservation Biology: Declines in Migrant Shorebird Populations from a Winter-Quarter Perspective. 29: 877-887 (Simmons RE, 2015).
- Agenda 21, various reports: A three-year project which began in mid-2001, to set out measures for the town to develop in a sustainable manner in line of Local Agenda 21 principals. Specific studies include a Wind Blown Sand Transport report (Danish International Development Agency , 2003), Hydrodynamic Modelling report (Danish International Development Agency , 2003) and overall Coastal Area Strategy and Action Plan (Municipality of Walvis Bay, 2003).
- Zoobenthos Survey of the Walvis Bay Lagoon (University of Namibia, 2012): Agenda 21 initiated a long term monitoring program, and subsequently a report was prepared for Walvis Bay Municipality setting out the changes in the benthic community of the Lagoon.
- The Ramsar convention website (Ramsar, 2017): information pertaining to the wise use of Rasmar wetlands, institutional documents and Ramsar wetland management plans.
- The Strategic Environmental Assessment (SEA) for the coastal areas of the Erongo and Kunene Regions (DHI Water & Environment, 2007).

6.5 CONSULTATION

Consultation with stakeholders and local experts either telephonically or personally was undertaken during the course of the ESIA process. ECC also conducted a series of community consultations, including door knocking and visiting neighbouring property owners; undertook general community engagements; held a public meeting; met with government agencies and had meetings with major stakeholders to seek feedback on the proposed project. These meetings were undertaken as follows:

- 10th May 2017 - Competent authority, scope confirmation with MET
- 22nd May 2017 – Consultation with Ramsar Convention Switzerland

- 23rd and 24th May 2017 – Neighbour door knocks and face to face
- 24th May 2017 – Stakeholder face to face
- 29th May 2017 – Ramsar Namibia
- 12th June 2017 – Public meeting
- 23rd June 2017 – Ministry of Fisheries and Marine Resources Swakopmund
- 14th August 2017 – Namport meeting
- 7th September 2017 – Namport meeting

The results of the public participation process are presented in Section 9 and have been fed into the ESIA process.

6.6 LIMITATIONS, UNCERTAINTIES AND ASSUMPTIONS

The identification of the receiving environment had several limitations:

- **Air Quality data:** No air quality sampling was undertaken as it was not deemed necessary to commission a survey because of the nature of the proposed project. A similar approach to that presented in Namport's Container Expansion project EIA report was adopted, and data/information used where available.
- **A baseline noise survey** for Namport was undertaken in 2009. The baseline derived during this survey has been used in this report. A new survey was not commissioned as it was not deemed necessary due to the short duration of noisy construction works (see chapter 4 for the project description); the nature of the proposed project; and the baseline in the Namport EIA report (Delta Marine Consultants, 2010) was considered robust and adequate to use in this assessment. It is recognised that the baseline has changed since the construction and operation of Phase 1 of the Namport's Container Expansion project. The projections identified in the Namport report have been incorporated into the baseline and assumptions have been made.
- **Zoobenthos:** University of Namibia (UNAM) have undertaken further surveys for zoobenthos to assess the potential effects the Namport's Container Expansion project is having on the marine environment. It was agreed that these would be made available to ECC for use in this ESIA and therefore additional surveys were not commissioned. These surveys have not been made available, therefore previous baseline surveys (2012) have been used to describe the baseline environment, with recognition that it is likely that the zoobenthos may have deteriorated as a result of the expansions; therefore, a precautious approach has been applied, which allows the worst-case scenario for potential effects to be identified.
- **Turbidity:** It is understood that turbidity surveys were undertaken by Namport during the construction and dredging activity for Namport's Container Expansion project (commenced May 2014). This data has been requested on various occasions, however has not yet been made available to ECC for incorporation in the ESIA. Assumptions in the assessment have been applied to address this data gap.

Where uncertainties exist, a precautious approach has been applied, allowing the worst-case scenario for potential impacts to be identified. Where limitation and uncertainties exist, assumptions have been made and applied during the assessment process. These have been clearly described in the baseline section.

6.7 WALVIS BAY LOCATION

Walvis Bay is a coastal town in the Erongo Region, approximately 400km from the Capital of Namibia, Windhoek. It is sited in the centre of the Namib coastline and covers an area approximately 30km^2. The town established at this location due to the natural deep-water bay.

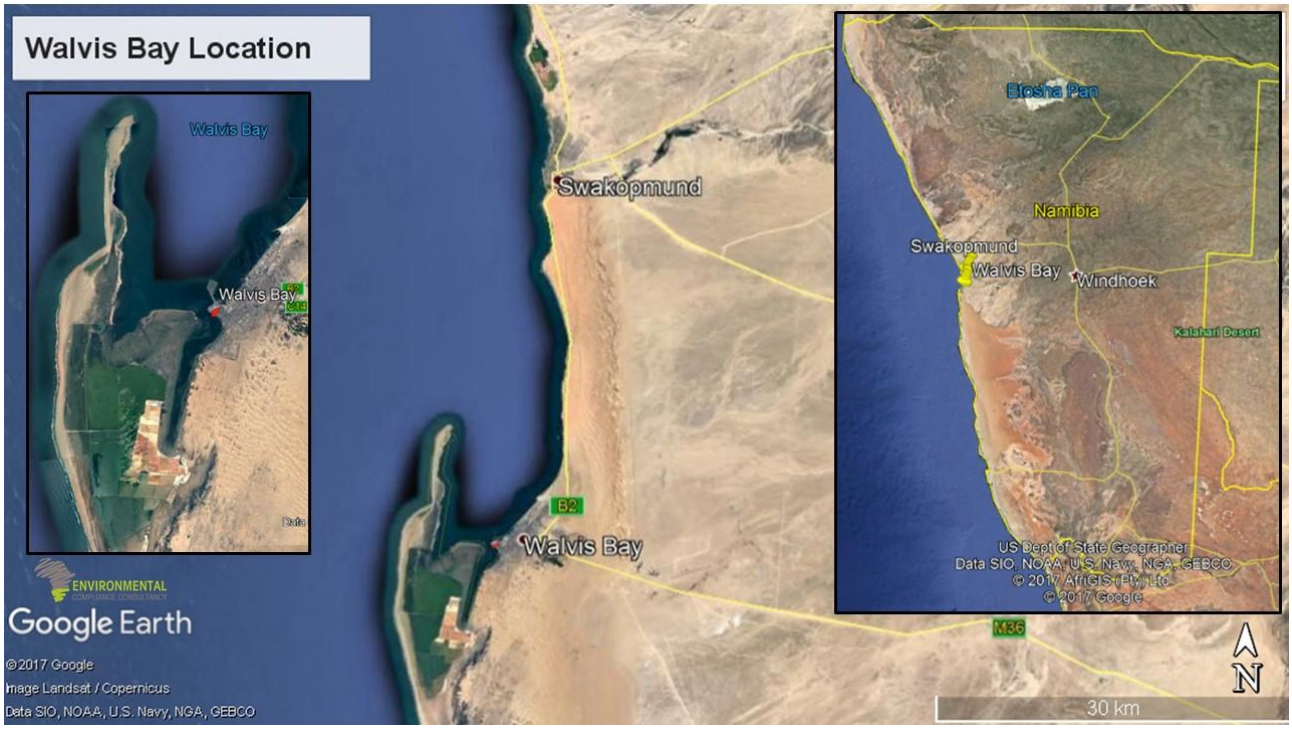


Figure 30 Location of Walvis Bay {Google Maps}

Walvis Bay lies at the estuary of the Kuiseb River, a linear oasis which forms a sharp boundary between the Namib Naukluft National Park to the south and the gravel plain desert to the east. A Dune Belt flanks Walvis Bay to the east which runs parallel along the coast up to Swakopmund, approximately 30km to the north of Walvis Bay. Figure 31 presents these features.

The area illustrated in Figure 31 is part of the designated Dorob National Park, which was gazetted under the Nature Conservation Ordinances No. 4 of 1975 on 1st December 2010. The National Park is bordered to the north by the Ugab River and the Skeleton Coast Park. The Omaruru River bisects it, while the Swakop River is situated just south of its boundary. The towns of Henties Bay and Swakopmund are found within its boundaries, along with the hamlet of Wlotzkasbaken (Ministry of Environment and Tourism , 2018).

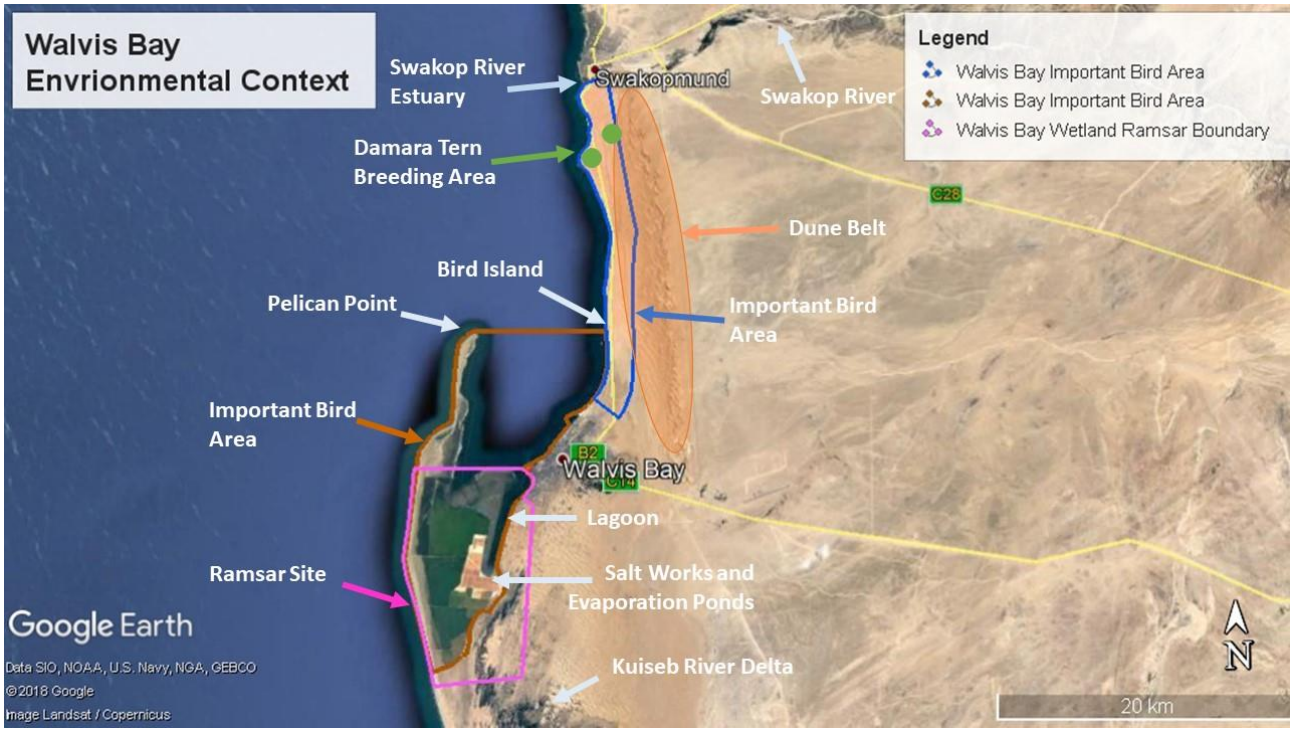


Figure 31 - Walvis Bay Environmental Context

6.8 BUILT ENVIRONMENT

6.8.1 HISTORY OF WALVIS BAY

Namibia's exploration by Europeans commenced as early as 1485, with the Portuguese visiting the area. Two centuries later, the Dutch East India Company explored the Atlantic coast and landed at Sandwich Bay in 1670. The British arrived in 1786, who surveyed sections of the coast, however it was not until the Dutch Meermin in 1793 proclaimed Dutch sovereignty over Walvis Bay. In 1795 the British took possession of all potential harbour sites along the Namibian coast, claiming Walvis Bay (Dierks, 2017).

In 1877, Walvis Bay and the surrounding territories were annexed, and the acquisition of Walvis Bay to the British was approved. The Germans moved into the area and annexed South West Africa from South Africa. In 1884, whilst remaining under the British, the port became part of the Cape Colony, which in 1920 joined the new Union of South Africa (despite the physical separation from the Union). South Africa seized South West Africa and imposed military rule during World War One. At the end the War, the League of Nations granted South Africa a mandate over the South West African Protectorate. Walvis Bay was subsequently transferred into South West Africa in 1922 (Dierks, 2017), and became independent in 1990.

The town as it is today, started to develop around 1844 with the arrival of the European settlers (Silverman, 2001). The marine resources off the coast were one of the key development drivers for the area; namely fish and whales. In 1914, there were two whaling companies. The First World War drove the whaling industry due to the increased requirement of glycerine, a whale by-product. The port area grew spaciously supporting the fishing and whaling industry, but also the import and export industry, exporting livestock and arms goods (Silverman, 2001).

The first permanent buildings (wooden shacks) were built in the vicinity of the Lagoon. By the 1880s, a grid street pattern had been laid out, and the parcels of land were sold off and developed. The magistrate's court, magistrate's residence, customs office and other residential buildings constituted the town at the turn of the 20th century. Significant development started in 1922 when Walvis Bay became part of South West Africa. A new railway

connection to Swakopmund was constructed and the port facilities were extended with the harbour first being dredged (Silverman, 2001).

The port continued to grow as a result of import and export demands, namely oil, and fish and minerals respectively. The fishing industry developed further, and fishing boomed in 1946. Factories rose across the harbour area to accommodate this boom. In the 1960's the Saltworks was established. The population of the town consequently increased, which resulted in the town area doubling. The Central Business District developed south-east of the port area. Residential areas established around the area and moving outwards along the coast in a spatial fashion due to the availability of unoccupied land. Kuisebmond and Narraville developed in 1959 and 1962 respectively. The town expanded spreading into the suburbs which have become part of Walvis Bay town, with Kuisebmond to the north of the Central Business District and Narraville to the south of the B2 (Silverman, 2001).

With the integration of Walvis Bay into South West Africa, the development of infrastructure boomed, connecting road and rail between the port and the rest of the protectorate. The town continues to grow as a result of the fishing, tourism, mining and manufacturing industries.

6.8.2 Walvis Bay Town Plan

The town of Walvis Bay and Walvis Bay Harbour are built on the east side of the Bay in one of the best natural harbours along the barren south-west African coast. The town stretches along the coast, in a north-southerly direction, with the Harbour taking up the majority of the coastline. Walvis Bay Lagoon and Saltworks are located to the south of the Bay (see section 6.9).

The B2 enters the town from the north connecting Walvis Bay to Swakopmund. The C14 joins the B2 from the east of the town, which passes Dune 7. The town is structured in a grid fashion with the central and southern parts of the town having roads running in a north-west to south-east, and south-west to north-east.

The town covers an area approximately 30km^2 which has been zoned into four general areas: Walvis Bay North; Walvis Bay East; Walvis Bay South; and Walvis Bay Central. Each residential area has different demographic and socio-economic characteristics. The lower income residential area is found in Walvis Bay North, which is predominantly resided by labourers. Walvis Bay East is a township, which also has a light industrial zone. Walvis Bay Central has a low-density residential area to the south and predominately contains zones for heavy industries (including the harbour area) and is the Central Business District, which is located immediately adjacent to the harbour. Walvis Bay South is also a low-density residential area for high-income groups. This area features around the Lagoon (Environ Dynamics, 2010).

The shopping and main amenity area of the town are on the north side of the Walvis Bay museum and is predominantly distributed between 12th Road to the east, 9th to the west, 6th Street to the north and Nangolo Mbumba Drive to the south. The town is served by two hospitals, the main hospital being the Welwitschia Hospital located south-eat of the Museum. The police station is to the north-east of the museum, and the train station is to the north of the main amenity area. The Ministry of Finance Ministry of Marine Resources, Ministry of Home Affairs and Immigration and MET have offices in the town centre close to the train station. There are four secondary schools, two in Walvis Bay Central, one in Naraville and one in Kuisebmond, and seven primary schools, three in the central area, one in Naraville and three in Kuisebmond. This provision is currently not compliant with the standards set by the Ministry of Education (Walvis Bay Municipality, 2014).

An industrial area is located between Circumferential and Grand Avenue. The town has a disjointed and fragmented Central Business District (CBD). There are small and localised street shopping facilities and a recently open mall at the town's entrance.

6.9 DEVELOPMENT IN WALVIS BAY AND AROUND THE LAGOON

The Walvis Bay Peninsula, reaching up to Pelican Point forms the sheltered Bay, providing protection from the Atlantic swells and south-westerly winds and currents (see Figure 32). Within the Bay lies the Harbour area to the east, Walvis Bay Lagoon to the south, and the Saltworks and Saltpans to the far south of the Lagoon.

Figure 32 Walvis Bay and Key Features {Google Maps}

6.9.1 HARBOR AREA

The Harbour comprises a commercial harbour in the southern section (Namport) and a fishing harbour in the northern portion. The Namport commercial harbour handles containerised and bulk cargo and is bounded on the west and north by the limits of Namport jurisdiction. The fishing harbour is bounded on the east by the shore and fish factories, which supports around 15 fish processing factories and their vessels. In the north-eastern corner is an artificial guano platform for nesting birds.

The Harbor area provides various facilities and operations: servicing of vessels participating in marine exploration and fishing; and serves as the country's main import/export facility. Exported goods are minerals such as uranium, copper, lead, feldspar, salt, beef and canned fish. Imports of general container cargo, motor vehicles, machinery, petroleum and bitumen also pass through the port facilities. Various cruise liners also make Walvis Bay one of their regular port of call.

6.9.2 NAMPORT

Namport is a state-owned enterprise, which manages the commercial Port of Walvis Bay and the Port of Luderitz. The main activities of the Port of Walvis Bay are managing vessel traffic and container cargo handling, undertake vessel repairs, support the fishing industry and manage passenger traffic. Namport's role is to exercise general infrastructural and regulatory functions (dredging and customs), together with nautical safety, navigational and other commercial facilities.

The port of Walvis Bay is split into three defined areas:

- The South Port: The commercial port with a container terminal
- The Fishing port: Accommodates various fish factories and associated activities
- The North Port: Not currently under development

Due to business growth in Namibia's ports, the increase of container ships increasing and throughput of container volumes from landlocked countries, there was a need to expand the port's capacity and services to meet this growth. Namport identified that the container terminal was not capable to support this growth; therefore a new container port facility (referred to as the Namport Container Expansion project) was proposed and approved.

Due to a shortage of land for the expansion, proposals for a new container terminal on reclaimed land inside the port limits was developed, upgrading the port's capacity from moving approximately 37,0000 containers per year (2016) to 1 million containers a year by 2019. The construction of the Container Expansion project was planned in three phases; the first phase commenced in May 2014 (Namport, 2015), which is 76% complete as of January 2018 (Gelderbloem, 2018). Land reclamation is 95% complete with civil works and installation of infrastructure around 65% complete. The Passenger Liner Jetty is 90% complete and the construction of the breakwater wall and marine has just commenced. Phase 1 is expected to be commissioned in 2019 and is currently on target. Phases 2 and 3 have not been scheduled as yet (see Section 6.11.2.1).

6.9.3 The Lagoon

The Lagoon (and Salt Pans) occupy approximately 13% of this Bay area and is 7km long (Delta Marine Consultants, 2010). The mouth of the Lagoon is at the south end of the Bay area, to the south-west of the town (further description on the Lagoon characteristics is provided in Section 6.23.2). Up until the early 1960s, the Lagoon remained unaffected by anthropological changes.

Local development has resulted in a reduction in the area of the Lagoon that traditionally was inundated on a regular or occasional basis. Along the northern and north-eastern perimeter of the Lagoon, residential suburbs and tourism developments occupy land that was formally part of the Lagoon (Delta Marine Consultants, 2010). Section 6.23.3 provides further detail on anthropogenic influences on the Lagoon environment.

6.9.4 The Saltworks

The Saltworks, owned by Walvis Bay Salt Holdings (Pty) Ltd was established in 1964 Lagoon to extract salt from seawater. The Saltworks developed on the south-western bank of the Lagoon as the area provided favourable conditions for the production of salt. Over the years, various evaporation ponds, crystallisers, pre-evaporation ponds and concentration ponds were developed. The last major expansion occurred in 2000.

The Saltworks and pans have been identified as potentially affecting the natural ecological and hydrological processes of the Lagoon, which may have contributed to siltation, and the reduction in size and associated tidal action has led to valid widespread concerns about the ecological sustainability of the Lagoon (see section 6.23) (Walvis Bay Municipality, 2008).

Even though the developments have altered the natural ecological and hydrological features of the Lagoon, the evaporation ponds have resulted in a positive change by providing a habitat for birds, including large numbers of flamingos, which feed off the microscopic crustaceans. The Lagoon and surrounding area were declared a Ramsar site in 1995 due to it ornithological features. Section 6.23.12 provides further information on the Ramsar site.

6.9.5 Other Development and Activities

A range of recreational activities takes place in and around the Lagoon. Sections 6.15.10 and 6.15.8 provide further detail.

The commercial farming of oysters is being undertaken in evaporation ponds in the Saltpans of the Lagoon and within the Namport boundaries of the Aquaculture Production Area 1 (Bay area). Commercial aquaculture and mariculture ventures started in Namibia in the late 1990's, which focuses on mussels and Oysters in the Bay area (Appendix J). At the time of writing, there were no committed plans to extend these mariculture activities.

6.10 Infrastructure and Waste Management

6.10.1 Transport Infrastructure

The Erongo Region is connected by the national road network to the rest of the country via Okahandja, Windhoek, and Otjiwarongo. The primary route is the B2 which connects Walvis Bay and Swakopmund. Two minor roads, the C28 and C14 form secondary routes to Windhoek and other smaller towns (see Figure 33).

The B2 forms part of the Trans Kalahari Highway which facilities trade as the road runs from Walvis Bay, through Botswana to Gauteng in South Africa. The road network links Walvis Bay to the Trans Caprivi Highway and stimulates trade with other Southern African Development Community (SADC) countries such as Zambia and Zimbabwe. The Walvis Bay Corridor Group has put in a great amount of effort to ensure that these corridors assist with exports to other landlocked countries (Environ Dynamics, 2010).

Figure 33 Main transport infrastructure Erongo Source: (Erongo Regional Council, 2017)

Walvis Bay Harbour, located to the south of the town, is one of Africa's most efficient and best equipped ports which can handle more than eight million tonnes of cargo per annum. It is the largest port in Namibia and is at the start and the end of four transport corridors, serving as a transport hub for regional and international trade between SADC countries, Europe, the Americas, and the rest of the world (Erongo Regional Council, 2017).

A national network of railways covering 2,382km connects Walvis Bay and Lüderitz with key destinations in Namibia and South Africa. Much of the containerised traffic at Walvis Bay goes by rail, and the Harbour has its own

marshalling yard for maximum operational efficiency. Thousands of tons of bulk minerals from mines in South Africa and Namibia are transported directly to the quayside by rail for export (Risk Based Solutions, 2012).

Approximately 15km south-east of the town is Walvis Bay International Airport, which is the second largest airport in Namibia handling over 20,000 aircraft and over 98,000 passengers in 2015. The airport operates daily flights to Windhoek, Johannesburg and Cape Town. The Airport is primed to become a leader in cargo handling for marine, coastal and mining activities in the area. Major developments at the airport in 2016 have resulted in the airport becoming Namibia's second international airport.

6.10.2 UTILITIES

The Erongo Region is connected to the well-developed national power grid, which is operated by Namibia Power Corporation (NamPower). Erongo Regional Distributor distributes and maintains the electricity network in the Erongo Region. The bulk power supply to Walvis Bay is distributed through underground supply cables from Paratus Power Station and associated substation (Walvis Bay Municipality, 2014).

NamWater extracts water from the Kuiseb river aquifers, which is pumped to bulk storage (dams) and then distributed across Walvis Bay.

Walvis Bay is one of the few towns in Namibia that enjoys world class telecommunications system, with telephone and internet connections widely available, thanks to recent substantial investment in the telecommunications infrastructure including the installation of optical fibre cable networks and broadband systems. An international satellite links Namibia to worldwide telecommunications services (Risk Based Solutions, 2012).

6.10.3 WASTE MANAGEMENT

A waste disposal landfill site and the hazardous waste site was constructed in 1999, 1.5km from the town centre near to the municipal sewerage facility. The landfill has a capacity of 2.8million m^3 with a 30-year lifespan. The existing solid waste landfill has sufficient capacity to cater for the town and town development as per the IUSDF until 2040 (Walvis Bay Municipality, 2014). The site has recycling collection points, which are leased to various businesses to manage recyclable waste. The municipality is responsible for the collection and removal of refuse from all households. Some businesses and industries also use the municipality to collect their waste (Municipality of Walvis Bay, 2005).

The hazardous waste site receives waste from various producers including Rossing Mine, the Gobabeb Research Station and construction companies. The site has a capacity of approximately 18,000m^3. An incinerator is on site for use for final disposal of hazardous waste (Municipality of Walvis Bay, 2005).

Walvis Bay also has a modern liquid waste disposal system which produces treated effluent by means of bio-filter and activated sludge process. A process in which sewerage water is treated and make available for reuse has also been introduced (Municipality of Walvis Bay, 2005).

6.11 WALVIS BAY FUTURE DEVELOPMENT

6.11.1 DEVELOPMENT OF THE TOWN

Walvis Bay is earmarked to become the leading industrial town in Namibia by 2030 due to its strategic location and transport networks (Walvis Bay Municipality, 2014). The current pace of economic development, including the industrial and housing sector, as well as future port expansion, long-term planning is a critical requirement, considering the impact such growth would have on roads, water, sewerage and electricity infrastructure in the long run. The town of Walvis Bay is expected to grow substantially to enable it to continue to be the leading industrial town in Namibia (Walvis Bay Municipality, 2014).

The town has grown in a northerly and southerly direction and is expected to grow inland to the east due to geographical and existing physical constraints, making the CBD less central to future residential areas. The Walvis Bay IUSDF (Walvis Bay Municipality, 2014) provides a development plan for the town, taking into consideration the projected population growth (see section 6.15.2) and the anticipated pattern of land use. The following development proposals presented in the IUSDF are expected to be developed or are being developed by 2030:

- Walvis Bay South Port Terminal (Namport's Container Expansion project, phases 2 and 3)
- Namport's Waterfront
- Walvis Bay North Port Terminal
- Development of 90 townships, 44,200 households (39 should be completed by 2018, 19,370);
- Other residential areas around Walvis Bay (Beachfront residential development and Inland Residential Developments)
- Several light industrial areas at various locations around the town;
- Heavy Industrial Area located east of the high dune belt;
- Rooikop Airport behind Dune 7;
- Eight secondary schools, 30 primary schools and 20 day-care centers;
- Additional community centers and clinics;
- Four new police stations, two fire stations and two cemeteries;
- Service centers within residential suburbs (shops, and secondary services);
- Seven new sports fields and eight local parks, all associated with the local service centers;
- Various open spaces which are linked by a dedicated network of pedestrian/cycle corridors;
- Various upgrades to utility services (bulk water supply, sewerage disposal, power supply and solid waste disposal); and
- Various changes, upgrades and new infrastructure for the road network in and around Walvis Bay.

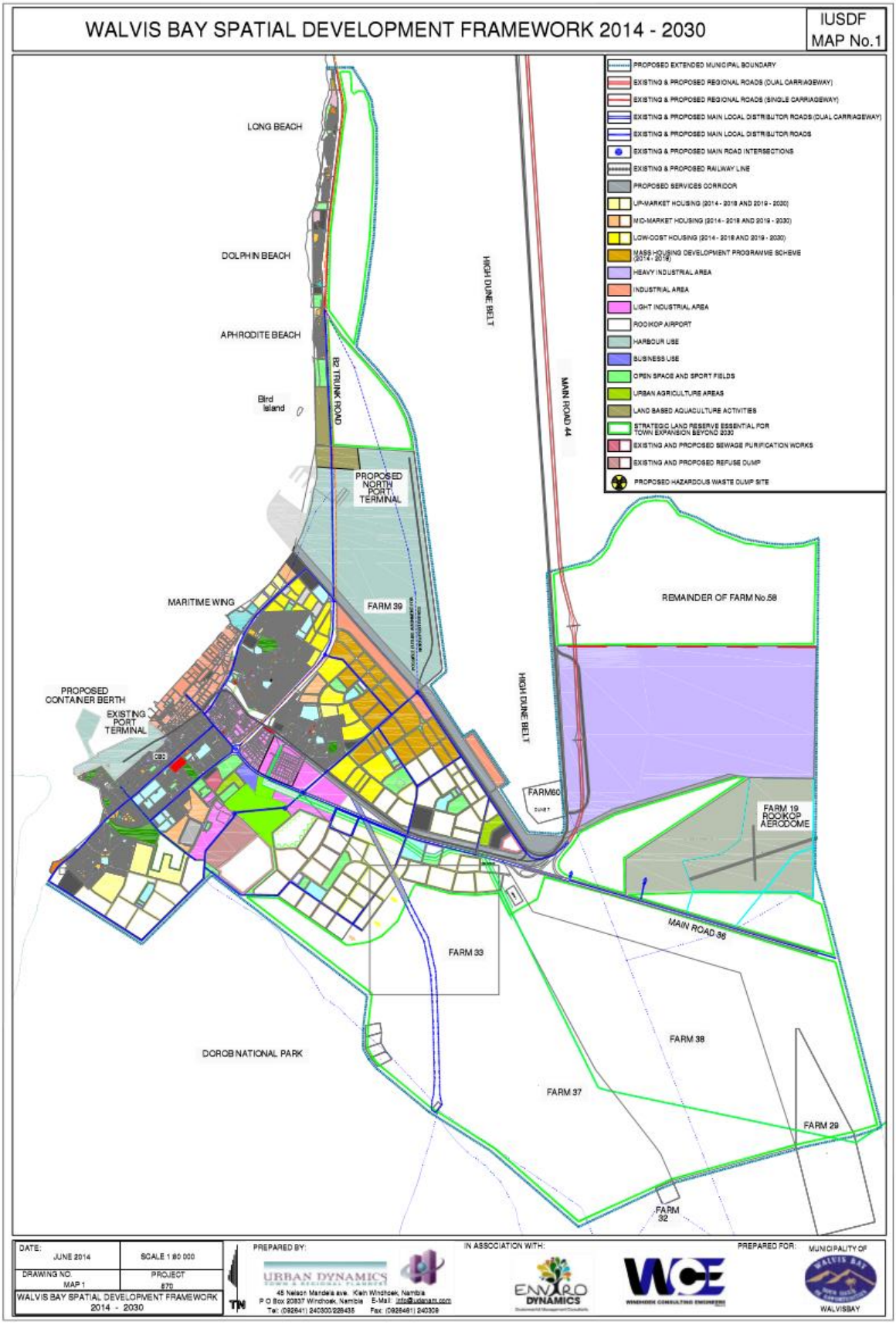


Figure 34 Walvis Bay Future Development Source: (Walvis Bay Municipality, 2014)

As a result of the CBD becoming less central to residential areas, a Regional Shopping Mall has been constructed and eight local service centres are proposed to cater for the residential areas growing towards the east. The road systems will also be upgraded; the D1984 will be upgraded to a dual carriageway and will become the official access to the town using the C14. The B2 will restrict use to passenger vehicles and tourists; and various other diversions and intersections will be built across the town. A strong feature of the plans is the development of open spaces linked by pedestrian and cycle corridors, and the development of waterfront areas (Figure 35), as detailed in the Walvis Bay IUSDF (Walvis Bay Municipality, 2014).

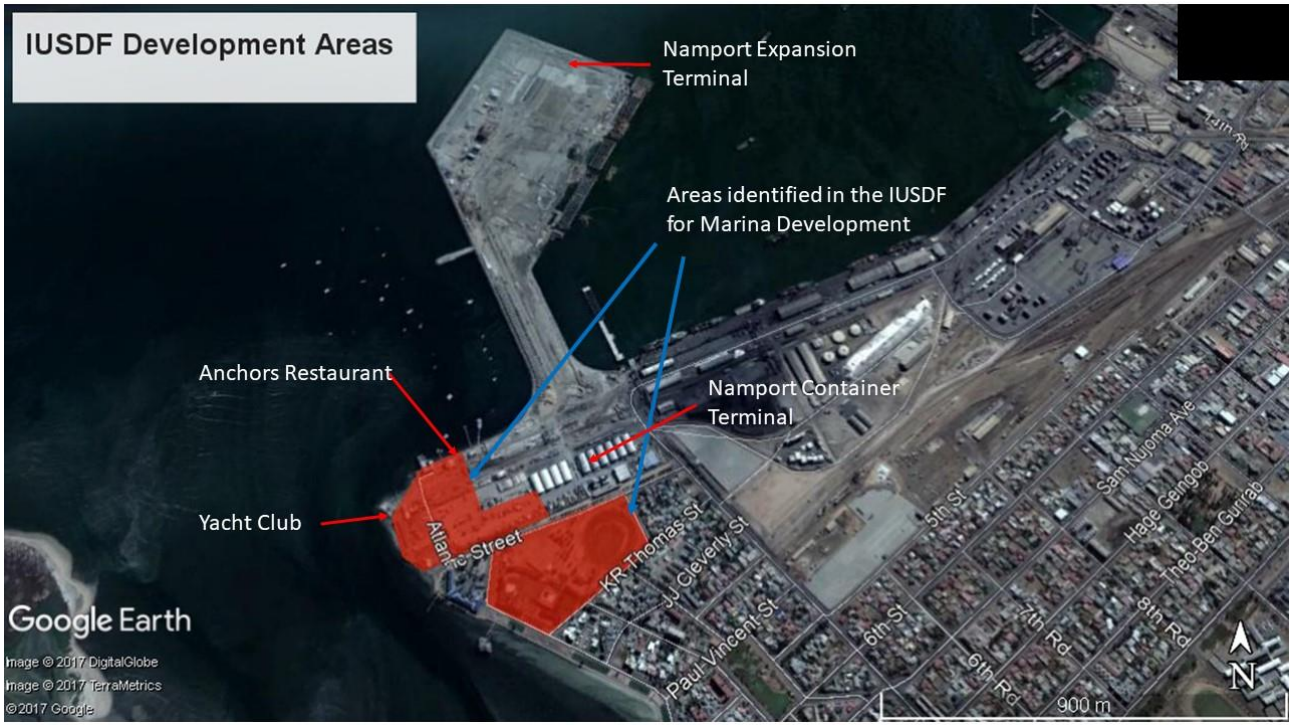


Figure 35 – IUSDF Development areas and surrounding features

6.11.2 NAMPORT'S FUTURE DEVELOPMENT

6.11.2.1 SOUTH PORT: NAMPORT CONTAINER EXPANSION PROJECT

As discussed in Section 6.9.2, phase 1 of Namport's Container Expansion project is 76% complete and is scheduled to be commissioned in 2019 (Gelderbloem, 2018). Phases 2 and 3 (see Figure 36) have not formally been scheduled as the requirement for the additional capacity that these extensions shall provide has not been fully examined and committed. Phase 1 shall provide double the current capability, and until it is understood when this capacity is almost utilised, phases 2 and 3 will not be developed. This is expected to be beyond 2025 (Gelderbloem, 2018).

The dredging and land reclamation activities for phase 1 took approximately two and a half years to be almost complete (95% (Gelderbloem, 2018)) (Namport, 2018). The actual total quantity of dredged material is unknown, however the Namport EIA and supporting reports is estimated approximately 4,265,000m^3 of material would be dredged and 33ha of land would be reclaimed (Delta Marine Consultants, 2009). Phases 2 would dredge 8,208,657m^3 (double phase 1) and reclaim 27.5ha of land and phase 3 would dredge 3,508,768m^3 and reclaim 60ha of land (Delta Marine Consultants, 2009)). Based on this, the dredging and land reclamation works could take approximately 8 to 10 years to complete, which does not include installation of port infrastructure and commissioning.

To fully implement phases 2 and 3 of Namport's Container Expansion project, a range of construction activities in the marine environment shall occur over a long period. Available information to provide a comprehensive understanding

of these works is limited. The Namport EIA Study (Delta Marine Consultants, 2010) provides some information on the construction and operations of these phases of the project, as well as the findings of the impact assessment. For example, maintenance dredging will be required, which will cover a larger area compared to the current maintenance dredging. It is also assumed that vessel movements and associated marine activities will increase, however the throughput and detailed is not known (Delta Marine Consultants, 2010).

Figure 36 – Namport Container Expansion project (Source: (Delta Marine Consultants, 2010))

6.11.2.2 NAMPORT'S WATERFRONT

As part of the Namport's Container Expansion project (and as discussed initially in Section 5.3), concept proposals have been publicised on for the development of a new waterfront and marina development, with the inclusion of a new Passenger Liner Jetty adjacent to the new Container Terminal (Namport , 2013). The new Passenger Liner Jetty is 90% complete as of January 2018 (Gelderbloem, 2018) and the Marina Breakwater is 30% complete. The completion date for these are unknown.

The area of land around Anchors and the Yacht Club (as illustrated in Figure 35) is partly leased by Namport to private businesses and used by Namport for the storage of containers and handling thereof. This area was identified for development by the Government Parastatal Namport. The proposals were first published and presented in Namport's 2012/2013 Annual Report (Namport , 2013), where Namport reported that the waterfront marina development had entered into feasibility studies and tendering stage. An expression of interest process for seeking private developers was undertaken in 2016, and Namport indicated that the appointment of a developer is envisaged by end of 2019 in the 2014/2015 Annual Report (Namport, 2015). The development of this waterfront cannot be progressed until the first phase of the Namport Container Expansion project is commissioned which will be in 2019 (pers. Comm. Mr. Elzevir Gelderbloem, 19th February 2018).

Indicative outline designs for the designated area and construction approaches were presented in the 2014 – 2015 annual report. The state-owned enterprise, is currently seeking part Government finance to develop this piece of land

into a waterfront and marine development. At the time of writing, no formal commitment from Government had been made relating to the allocation of funds for the proposed 'Namport' waterfront.

6.11.2.3 NORTH PORT

The 5th NDP sets out four pillars to guide the development of the country, which are broken down in to focus areas. Through these focus areas, targets have been set to aid the progression of development, in particular for the port of Walvis Bay:

- Focus area 2.2.8, Structure Transformation through Value-added Industrialisation sets out targets for tourism;
- Focus area 2.3.3, Expansion and Modernisation of Physical Infrastructure, Transport and Logistics sets out targets for the Port of Walvis Bay; and
- Focus area 2.4, Strengthened Export Capacity and Greater Regional Integration.

To accommodate the targets, the Port of Walvis Bay is set to expand even further. The North Port area has been proposed to be developed to provide additional capacity and capabilities. The North Port has been identified in the IUSDF and Namport has purchased the land from the Municipality. Concept designs have been drafted, however whilst taking these into consideration and the need for the additional capacity to support the growth of Namibia, the time of writing the certainty of this project is considered to be low.

6.12 Description and Current Use of the Proposed Site

The site for the proposed project is located approximately 1.5km south of the town centre (the CBD), immediately south of the existing Namport container terminal on the seafront at the mouth of the Lagoon. The area for the proposed project will utilise both onshore and offshore areas. The land portion covers an area of land currently zoned as Private Open Space covering approximately 7ha, and a Road Reserve (see section 4.3.1 for further detail). The area is bordered Atlantic Street to the north, KR Thomas Street to the south and 4th Road to the east. The south end is the Road Reserve which includes The Esplanade and the Lagoon Promenade. The offshore area takes an area up to and around The Raft Restaurant out into the Lagoon.

The Esplanade runs along the Lagoon past The Raft Restaurant and connects to Atlantic Street by the Protea Hotel. The hotel access is provided off The Esplanade. Atlantic Street runs between the proposed project site and the Namport container terminal, and provides access to several small businesses and facilities, including the Yacht Club, the Boardwalk, Sarah se Gat and Anchors restaurant. KR Thomas St runs between a residential area and the site, connecting The Esplanade to 5th Road, and provides access to side streets, residential properties and guesthouses. 4th Road provides access to residential properties.

5th Road and The Esplanade are the main access routes to the site from the central and northern areas of town and southern town area respectively. Both of which join the main access route in and out of the town from the south.

The Lagoon Promenade is approximately 4km long and runs parallel to the coast and The Esplanade, from the Protea Hotel to Esplanade Park. It is a scenic coastal path for pedestrians and cyclists, and provides areas for tourists to view and photograph flamingos and pelicans. The Promenade passes several restaurants and hotels including The Raft, Oyster Box Guesthouse, and the Flamingo Villas Boutique. The proposed project site is at the north end of the Promenade.

The proposed project area has a range of community facilities: the Walvis Bay Cricket Oval and cricket club, Tennis courts, swimming pool and Jukskei courts (see Figure 37). Local residents use these facilities; the swimming pool has, for many years, hosted school and club sporting days, school sports events, competitions and Navy training exercises are ongoing. The cricket field is currently home to the Junior Coastal Cricket Academy an academy to train aspiring young Namibian cricketers and the development of Cricket in the town of Walvis Bay. The cricket oval periodically hosts cricket tournaments.

The public open space or green area is used by many residents of Walvis Bay for activities such as dog walks, exercise, picnics, a safe place for children to play, and provides an open space for families to be together during holiday periods. The area has established palm trees and other vegetation.

Figure 37 – Existing Community Facilities

The proposed project site is currently occupied by community facilities. These facilities will be relocated to two sites: the cricket oval to a football pitch in Kuisebmosnd; and swimming pool, tennis and jukskei courts to the Jan Wilken Stadium. The locations are presented on Figure 6.

- The **football pitch in Kuisebmosnd** is in a residential area in the northern area of Walvis Bay town. The site comprises the football pitch, tennis courts and other recreational facilities.
- The **Jan Wilken stadium** is located in the centre of the town, east of the CBD in a built-up urban/residential area. The site is adjacent to the Walvis Bay Museum, Welwitschia Hospital, residential properties and a redundant site. The Jan Wilken site is the central sporting grounds in Walvis Bay and currently has a multi-purpose indoor sports facility, a gym and squash courts. Bowling greens, a rugby stadium and field, netball courts, archery practice range and a cricket club with an international sized cricket field are also currently established at the Jan Wilken sports grounds.

6.13 On-Site Contamination and Asbestos

Prior to all three sites being used primarily for recreation, it is believed they were unoccupied, therefore there is limited potential for the ground to be contaminated.

A site survey of all buildings on the proposed project site has been undertaken and samples from have been taken and tested. Asbestos has been found in the roof sheeting of the kiosk, part of the swimming pool facilities. No other facilities are expected to have asbestos in the building materials.

6.14 Existing and Future Traffic and Road Use

6.14.1 Existing

A traffic study was undertaken in November 2016 to model existing traffic conditions around the proposed project site, predict future traffic flows and assess if the local transport network can accommodate the future flows. The full report is contained in Appendix G.

The existing traffic baseline is heavily influenced by the Namport operations and the construction of the Namport Container Expansion project. Construction vehicles access the new Namport extension and construction area from 5th Road and Atlantic Street. The traffic survey recorded up to 300 trucks per day between 06:00 and 18:00 along these roads. In addition to these vehicles, a similar number of trucks delivering salt to Namport for export were also recorded. Based on these surveys, between 10 and 25 trucks were surveyed per hour.

Other road users include local residents commuting to and from work, and the local community and tourists travelling to and from the existing waterfront. Nangolo Mbumba Drive experiences the highest traffic volumes during the peak hours for both weekday and weekends, with 690 vehicles being experienced during morning peak hour, 1,055 during afternoon peak hour and 690 vehicles at weekends. 5th Road experienced the most vehicles in the roads surrounding the site; 130, 220 and 95 respectively (excluding trucks) and The Esplanade Drive experienced the least; 80, 100 and 65 respectively.

The current transport network can accommodate the existing traffic demand.

6.14.2 Future

The traffic study (Appendix G) modelled future traffic volumes for 2022 by applying a 4.7% growth rate for a five-year period, as per the predicted population growth rate documented in the Walvis Bay IUSDF (Walvis Bay Municipality, 2014). The study assumed the second phase of the Namport Container Expansion project would be completed by 2025 and thus traffic generation will continue to be experienced by this project until that date. Recent information obtained from Namport confirms that phase 2 and 3 will not be developed until after 2025, therefore it is assumed that traffic generation will reduce one phase one nears completion. It will however be greater than the volume of traffic experienced prior to the Container Expansion project as there will be an increase in port activities and operations. Traffic will then increase once the construction works of phases 2 and 3 commence.

6.15 SOCIO-ECONOMIC

6.15.1 Governance

Namibia was established in 1990 and is led by a democratically-elected and stable government. The country ranked top fifth out of 54 African countries in the Ibrahim Index of African Governance in 2015 for the indicators including the quality of governance and the government's ability to support human development, sustainable economic opportunity, rule of law and human rights (National Planning Commission, 2017).

As a result of sound governance and stable macroeconomic management, Namibia has experienced rapid socio-economic development. Namibia has achieved the level of 'medium human development' and ranks 125th on the Human Development Index out of 188 countries (National Planning Commission, 2017).

Walvis Bay is the regional capital of the Erongo Region. The Erongo Regional Council is responsible for the planning and development of the region in a sustainable manner for the benefit of its inhabitants by establishing, managing and controlling of settlement areas focusing on core services. The council is accountable for an area of 63,586km^2, about 7.7% of the total area of Namibia (Erongo Regional Council, 2017).

Walvis Bay falls under the jurisdiction of the Walvis Bay Municipality, whose authority stretches up to the Swakop River in the North and to the Kuiseb River in the South. This area is divided by the road between Walvis Bay and Swakopmund, with the dune side under the jurisdiction of the Ministry of Environment and Tourism, and the coastal beach area under the control of the Walvis Bay Municipality (Environ Dynamics, 2010).

6.15.2 Demographic Profile

Namibia is one of the least densely populated countries in the world, with a population of 2.3 million people. Life expectancy is 65 years and expected years of schooling is 11.7 (National Planning Commission, 2017). In the 2011 Census, the population of the Erongo Region was 150,809, a growth rate of 28.6% since 2001. Walvis Bay had a population of 62,096, making it the third densely populated city in the country. The population of Namibia has been growing steadily; the population growth rate between 2001 and 2011 (the two census) was 1.4%, with urban areas growing quicker than rural areas. The highest growth rate in Namibia was recorded in the Erongo region (3.4%). This was mainly influenced by in-migration; more than 40% of residents in these regions were born elsewhere (Namibia Statistics Agency, 2011).

Namibia's population is expected to increase from an estimated 2.11 million in 2011 to 3.44 million by 2041 (63%). It is predicted that urbanisation will continue, with an increase from 43% population in urban areas in 2011 to 67% in 2041. The populations of Khomas and Erongo are projected to increase the most with over a third of Namibia's population to live in these two regions (Namibia Statistics Agency, 2011).

In Walvis Bay, industrial activity and port related activities will continue to grow, along with the migration of skills and unskilled workers. This will contribute to a continual population growth rate in the town. The Walvis Bay IUSDF (Walvis Bay Municipality, 2014) has applied a predicted growth rate of 4.7%, applying historical growth rates and future development growth. Using this, Walvis Bay's population is projected to grow up to around 180,000 by the year 2030 (doubling the population).

The average Namibian household size is 4.4 according to the 2011 Namibia Population and Housing Census (Namibia Statistics Agency, 2011).

6.15.3 HIV / Aids in Namibia

HIV/Aids in Namibia is a critical public health issue and is one of the leading causes of death. Namibia has a generalised HIV epidemic, meaning that there is a high HIV prevalence among the whole population. The epidemic is now starting to stabilise, after a rapid increase from the time that the first case of HIV was reported in 1986 through until a peak in 2002. HIV prevalence in Namibia is not yet measured through a population based survey, instead, HIV-prevalence among pregnant women attending Ante Natal Clinics is used. In 2010, 18.8% of pregnant women were HIV positive, a reduction from the high of 22% in 2002. However, HIV prevalence is unevenly distributed throughout the country, therefore this figure is not a national representation. The overall trend illustrates that HIV prevalence is stabilising rather than increasing (UNICEF, 2011).

Walvis Bay has 17.6% HIV prevalence, which is similar to the national of 17.2%, ranking 16th in Namibia (Ministry of Health and Social Services, 2016).

6.15.4 Employment

The Erongo Region is one of the most affluent regions in Namibia, with the second highest per capita income in Namibia at N$16 819 per annum (Environ Dynamics, 2010). In Walvis Bay, most employment is through the Harbour, fishing industry and the processing of sea salt (Walvis Bay Municipality, 2008).

The labour force participation rate is the proportion of the economically active people in a given population group, which is calculated as the number of economically active people divided by the total population in the same

population group. The labour force participation for the country was 64.0%, and 79% for the Erongo Region. The unemployment rate in the Erongo Region was around 30% unemployment, lower than the national rate of 37% (Namibia Statistics Agency, 2011).

6.15.5 Crime

Namibia's crime index is 78.53. In the financial year, March 2008 – February 2009, crimes reported in Namibia amounted to 96,200. In 2009/2010 crimes reported were 90,675 and in 2010/11 to 90,675. More than two-fifths of all reported crimes occurred in Windhoek, where the majority of reported crimes were burglaries, robberies and assaults (Insight Namibia, 2012).

6.15.6 Economic Activities

The Namibian economy has grown on average by 4.6% per year between 2012 and 2016, however, slowed down in 2016 to 0.2% due to a reduction in productivity in the farming industry. The growth rate over the years has not reduced unemployment; in 2016 nearly 18% of the population lived in poverty. A lack of industrialisation and infrastructure has contributed to Namibia's economic imbalance. The 5th Namibian NDP (National Planning Commission, 2017) states that by modernising and industrialising of the major sectors of agriculture, fisheries, manufacturing, mining and tourism, and by providing trading opportunities so that workers can upgrade their skills, Namibia will create jobs in a diverse range of industries which will improve the economy.

Mining is the largest income earner in Namibia followed by tourism, fishing and manufacturing. Agriculture contributes 3.8% to GDP, but supports above 70% of the Namibian population and employs about a third of the working force. In the Walvis Bay area, the economy is driven by four main industries: fishing, tourism, manufacturing and the harbour.

Although the mining industry is a large income earner in the Erongo Region due to several mines being in the area including Rossing Uranium Mine, it is not considerable in Walvis Bay. Having said that, the industry does provide critical upstream, downstream and side stream linkages for the local and national economy, e.g. transport services, power and skills.

6.1.1.1 Fishing Economy

The fishing grounds off the coast of Namibia provide over 20 species of fish, lobsters and crabs which are commercially harvested. Namibia's fishing industry is the country's second biggest export earner of foreign currency after mining. 90% of the national output of fish is exported (Erongo Regional Council, 2017). Over a period of 50 years, the industry has established itself in the world fish market; while contributing approximately 7% to the overall GDP, it also accounts for 25% of foreign exchange earnings (Environ Dynamics, 2010).

The commercial fishing industry is the cornerstone of Walvis Bay's economy; it is the biggest employer as it employs approximately 10,000 people throughout its value chain. Even though the fishing industry is subject to seasonal and stock variation, it continues to play an important role in the economy of Walvis Bay. More than 70% of the industries in Walvis Bay are directly or indirectly dependent on the fishing industry. Investment opportunities are presented in the support and service sectors, including marketing, production and packaging related to the industry (Environ Dynamics, 2010).

6.1.1.2 Tourism Economy

The tourism industry is an important contributor to the generation of foreign exchange earnings, investments, revenue, employment, rural development, poverty reduction and to the growth of the country's economy. Tourism also creates strong direct and peripheral benefits because of its multiplier effect, based on its resilience on a wide spread of supplies and services. Hotels and restaurants, a proxy for the tourism sector grew by an average of 6.6% in

the last five years, which contributed about 1.8% to GDP which is estimated to the foreign exchange earnings increased to about N$4,682 billion. The target in the 5th NDP is to increase tourist arrivals from 1.4 million to 1.8 million by 2021/22 and increase employment from 29,000 to 43,000 (National Planning Commission, 2017).

6.1.1.3 Local Manufacturing Economy

Namibia has a small manufacturing sector, amounting to 14.3% of total GDP at 2008 prices. This sector consists mainly of meat processing, processing natural products for export or producing basic consumer goods and fish processing on shore. In an effort to diversify and expand the manufacturing sector in Walvis Bay, while stimulating economic growth, the Export Processing Zone (EPZ) was established in 1996 to provide an attractive package of fiscal incentives for local and foreign investors. The EPZ contributes to the development of the country's manufacturing sector while creating much needed employment opportunities. The main manufacturing activities in Walvis Bay thus take place within the EPZ. The manufactured products include plastic pallets and products, automotive parts for Volkswagen and Audi vehicles, fishing accessories, bathroom fittings, clothing and fishing related accessories. The cutting and polishing of diamonds are also conducted in this area. In addition, the scope for future investors in the EPZ includes the manufacturing of footwear, leather products, electronic equipment and various foodstuffs (Environ Dynamics, 2010).

6.1.1.4 Harbor Operations Economy

Businesses in Namibia's ports are increasing mainly due to the country's economic growth in industries such as mining and fisheries; the lack of other available ports in Namibia or on the western coast of Southern Africa; but also as a result of the economies of SADC countries developing. Import and export activities are increasing, and Walvis Bay is becoming more preferential for a hub to transport goods into SADC countries as ports in South Africa are at least three more days travel when travelling from the west.

As a result of the Harbour and port capabilities increasing, a knock-on effect will occur in the area; other businesses will benefit such as hotels and other service providers.

6.15.7 Local Businesses

The past 4 years have seen a growth in the number of businesses in Walvis Bay, increasing from 2 000 to between 5,000 to 6,000 Small Medium Enterprises (SMEs). The growth in the number of companies is mainly related to the transport sector. This includes companies involved with freight forwarding, truck and ship repairs, and storage facilities; for the latter, the request for warehousing has increased. It is expected that the number of new SMEs will grow rapidly as new business opportunities emerge. The growth can be attributed to the increase in mining activities, the corridor development, and the expansion of Namport's container terminal (Environ Dynamics, 2010).

Local businesses in the area surrounding the site (500m from the site boundary) for the proposed project include:

- The Protea Pelican Bay Hotel is part of the Marriott International group, a leading global lodging company with more than 6,000 properties in 122 countries and territories. The hotel has 48 rooms, a Beauty Spa and dining facilities;
- Various restaurants: Anchors Restaurant, the Boardwalk, Lyon Des Sables Restaurant, Brume sur le port, The Venue and View Café;
- The Raft, a privately-owned business and is located the end of a jetty in the Meersig Lagoon. The Raft is an iconic feature of Walvis Bay as it is made out of solid wood timbers from the original Namibian Walvis Bay jetty. It is one of the few buildings remaining in Walvis Bay that retain the character and design of the stilt buildings of the 1960 era designed for floods. The restaurant area overlooks Meersig Lagoon where birdlife and marine life can be viewed. The Raft attracts local and international visitors. The Raft requires frequent maintenance and up kept due to the harsh coastal conditions it faces.

- Various privately owned local Guest Houses and hotels, including the Oyster Box, Langholm hotel, the Courtyard and Loubser's B&B.
- Tourism providers include Catamaran Charters and Sandwich Harbour 4x4;
- The Walvis Bay Yacht Club (WBYC), located to the south of the Harbour. Established in 1961 and offers a range of activities from dolphin cruises, sailing, canoeing, windsurfing, kite-surfing, power-boating, training and all other related and associated sporting disciplines. Private boats and yachts are either anchored in the bay area or launched at the available slipways (the slipway is located approximately 400m from the proposed project site). The WBYC has a restaurant which also caters for functions such as weddings and seminars, seating up to 90 people (Walvis Bay Yacht Club, 2017);
- Walvis Bay Salt Holdings operates the Saltworks which processes 24 million tons of seawater each year to produce more than 650,000 tons of high quality salt. The majority of the salt produced by Walvis Bay Salt Refiners is used by the chlor-alkali industry for the production of chlorine and caustic soda. In addition, the salt is used as a fodder supplement for cattle and also refined for human consumption. Bulk consignments of salt are shipped to other countries, mainly South Africa. Walvis Bay Salt Refiners is also a commercial producer of high-quality oysters supplied to customers throughout southern Africa. The plankton-rich seawater is an ideal food source for the oysters (Environ Dynamics, 2010); and
- Informal Vendors: The car park area near the restaurant Anchors has become an area for informal vendors to market their goods to tourists frequenting the area. It is not a formalised area and as such makeshift shelters and shop have been built.

6.15.8 Tourism in Walvis Bay

Tourists are attracted to the Walvis Bay area for the bird life, the Saltworks and pink evaporation ponds, marine life, Dune 7 and surrounding sand dunes. Desert tours, sightseeing trips, tours to Dune 7, dune-boarding, quad biking, 4X4 Off-road recreational driving, paragliding, scenic flights, and filming and photography are all available in Walvis Bay. There are currently eight marine tour operators and two kayaking operators. It is estimated that 600 tourists go on dolphin tours daily, departing from the yacht club area (Risk Based Solutions, 2012).

A local museum in the Civic Centre and the Rhenish mission church (located on 5th Road and Thomas Morris St, 1.5km from the proposed project site) established in 1880 are also tourist attractions. A variety of hospitality establishments such as hotels, lodges, guesthouses cater for tourists and holidaymakers. A hotel is located at Pelican Point that is accessible by 4x4 vehicles. Paaltjies beach on the sandspit is a popular local spot for shore anglers. Angling, from small craft or from the beach, is a major form of recreation throughout the coastal reaches of the Walvis Bay area.

The Dune belt area is the only coastal dune area that is easily accessible to the public provides multiple tourism use practices. The area also contains a diversity of biophysical features and attractive landscape. Land-based and nature-based tourism activities are also available.

The Lagoon is one of the key tourist features of the area and various activities are centred around it. Sailing, wind-surfing and kite-boarding are popular activities on the Lagoon. Wind conditions on the outer Lagoon make this one of the world's best locations for wind- and kite-surf speed sailing.

Capitalising on this resource, many guesthouses have been established around the Lagoon, offering a view of the rich bird life against the backdrop of sunsets. The number of guesthouses in Walvis Bay has grown since 1995; along with the Protea Hotels they have an average occupancy rate of between 70-80%. This is due to the increase in business tourism, as the increased economic activities in Walvis Bay drawing business to this area. Often, teams working at the ship and rig repair yard reside at these guesthouses and hotels for long periods of time of up to two months or more. Furthermore, February and March see an influx of fishermen to the area as they use Walvis Bay as their basis for angling excursions (Environ Dynamics, 2010).

6.15.9 TOURISM GROWTH

Tourism (and eco-tourism) is the fastest-growing industry in Walvis Bay. The main limiting factor to tourism is infrastructure, which is echoed in the 5th NDP; some tourist spots lack infrastructure which is hampering growth, which needs to be actioned over the next five years to reach these targets (National Planning Commission, 2017).

Tourism is a thriving industry in Namibia and has been increasing over the years: in 2015 a total of 1,387,773 tourists arrived in Namibia, which was a 5.1% growth rate from 2014. This growth rate was lower than the year before, which was a 12% increase between 2013 and 2014 (Ministry of Environment and Tourism, 2015).

Whilst statistics for 2015 to 2016 / 2016 to 2017 have not been released, it has been reported that 2016 experienced one of the best results over the last decade, with tourism accommodation properties (bed spaces) recording an average of 60% occupancy across the country (The Economist, 2017).

The Government has recognised and prioritised tourism development in various legislative and policy documents, setting out the approach to growing the tourism industry into the most competitive tourism destination in Africa. To influence development, the Government has set targets of increasing tourist arrivals by 8% from 2016 to 2020, with a yield (per tourist) of a 50% increase. To support this growth target, nine subsectors/products have been identified (Ministry of Environment and Tourism, 2016):

- Wildlife tourism;
- Trophy hunting tourism;
- Coastal tourism;
- Community based tourism;
- Cruise tourism;
- Circuit development/route development model;
- Luxury affordability;
- Meetings, incentives, conference and event tourism, and
- Medical and retail tourism.

6.15.10 COMMUNITY AND RECREATIONAL FACILITIES

The town has a range of community and recreational facilities which are distributed around the town. These facilities include Hospitals, primary schools, high schools, higher education (university), recreational facilities, cricket grounds, tennis courts, swimming pools, open spaces, Walvis Bay Museum, hotels, lodges, guest houses, camping and caravan parks.

The proposed project site is currently occupied with green spaces, the Walvis Bay Cricket Oval and cricket club, Tennis courts, swimming pool and Jukskei courts. South of Paul Vincent Street is an open green space, approximately 300m from the boundary of the proposed site. Approximately 1.7km is the Sparta field sports facilities, which has a clubhouse, cricket oval, soccer field and rugby pitch. Open green spaces are dotted along the Lagoon coastline between the Promenade, a wide pedestrian seafront path, and the Esplanade.

A small boat ramp for launching motor boats into the Bay is located approx. 200 m from the proposed project site, as part of the Yacht Club.

6.15.11 CULTURAL HERITAGE

On the coast of Namibia, dense local concentrations of archaeological sites are associated with some of the larger river mouths. Open coastline environments are generally poor in archaeological sites, as are the mouths of smaller rivers. The river courses, although mainly dry, had in the past sufficient water beneath the surface to sustain small human groups. River environments also have edible plants and wild game, and these, combined with littoral and

marine foods, offer a more stable subsistence base than any area in the immediate hinterland. The combination of such resources in the vicinity of the Kuiseb Delta led to humans using the area and therefore has the largest concentration of archaeological sites on a coastline over 2,000 km in length (Risk Based Solutions, 2012).

Archaeological sites and remains around Walvis Bay have been recorded. To the north of Walvis Bay, there is a minor group of sites associated with the mouth of the extinct Tumas River. To the south, there are two important archaeological localities, Frederiksdam and Sandwich Harbour. There is little historic value in the surrounding area of the proposed site; the area with archaeological and historic importance is in the lower Kuiseb River between Gobabeb and Rooibank which is associated with a narrow strip of thinly scattered sites close to the course of the river itself. The overall picture of archaeological sites is therefore of a distribution that is confined to the lower Kuiseb until it flares out among the Walvis Bay dunefields, particularly in the area nearest to the Lagoon (Risk Based Solutions, 2012).

Walvis Bay has various places of worship, the closest one to the proposed site being the Baptist Church on the corner of 5th Road and Peter Dixon street, approximately 1km south-east. No other archaeological or heritage sites are within or surrounding the proposed project site.

6.15.12 AIR QUALITY

Sensitive receptors surrounding the proposed project area are as follows and illustrated in Figure 38:

- 47 Residents in properties and guest houses, particularly those adjacent to the site on Kr Thomas Street and 4th Road;
- Residents in properties and guest houses along vehicle access routes during construction: Atlantic Street, 5th Road and the D1986;
- Residents in properties and guest houses along vehicle access routes during operation, which will be predominately Atlantic Street, KR Thomas Street, 5th Road and the D1986;
- Visitors and workers at the Protea Pelican Bay Hotel; and
- Users of the Lagoon Promenade.

Figure 38 – Sensitive receptors to air quality

The main complaint over the years has been the unpleasant odour from the fish processing industry. The prevailing southerly winds that blow northerly to north-westerly help to dissipate any pollution (Delta Marine Consultants, 2010).

The local air quality has been derived from a desk-based study and observations from the site visit. The following sources have been identified through the desk-based study:

- Walvis Bay does not have heavy industries that could be the source of substantial amounts of harmful emissions and pollutants, for example sulphur dioxide, nitrogen oxide and mercury;
- The fish processing industry and the sewerage treatment facility result in foul odours which tend to spread north due to the predominant southerly winds;
- The fishing processing plants, Namport's existing operations and certain shipping activities undertake fuel combustion which can lead to carbon dioxide, sulphur dioxide, nitrogen oxide and particulates;
- Vehicle exhausts in and around the town; and

- Construction works of Namport Container Expansion project are likely to be a source of increased dust from land-based transport movements and construction activities, and small quantities of pollutants such as nitrogen oxides, carbon monoxide, volatile organic compounds, sulphur oxides and particulate matters generated as a result of increased shipping and road traffic.

The atmospheric dispersion potential in Walvis Bay is expected to be effective for a lot of the time due to the frequent moderate to strong winds (see Section 6.17), and the high daytime temperatures. Poor dispersion conditions are most likely to occur at night when low temperatures coincide with light or calm winds. The poorest dispersion conditions are likely to occur between May and November when the lowest nighttime temperatures occur (Walvis Bay Municipality, 2014).

The number of these sources is considered to be small and atmospheric dispersion is generally good, therefore ambient air quality is regarded as generally good.

6.15.13 NOISE AND VIBRATION

Sensitive receptors surrounding the proposed project area are the same as for Air Quality, in addition to ecological receptors in the marine environment including mammals, cetaceans and fish.

A noise survey was undertaken in 2009 for the Namport Container Expansion project. A summary of the ambient noise levels around the proposed site is summarised in Table 16. The main source of noise emissions was road traffic (Safetech, 2009).

Table 16 Summary of baseline noise results

Noise monitoring Location	Morning peak $L_{Req.T}$ dB(A)	Afternoon peak $L_{Req.T}$ dB(A)	Night time $L_{Req.T}$ dB(A)
Atlantic Street next to Protea Hotel Close to the Harbour and community facilities	42.1	68.3	64.3
Corner of Atlantic Street and 5th Road Residential Area	45.9	66.6	59.6
Corner of 5th Road and JH De Waard Street Residential Area	46.8	71.2	59.1
Corner of 5th Road and 5th Street Residential Area	52.6	70.9	58.2

The South African regulatory and guidance reports provide typical levels of noise in various types of districts. The South African National Standards (SANS) 10103:2008 (SANS 10103:2008) provides typical rating levels for noise in various types of districts, as described in Table 17.

Table 17 Typical rating levels for noise in various types of districts. [Source: (Safetech, 2009)]

Type of District	Equivalent Continuous Rating Level, LReq.T for Noise					
	Outdoors (dB(A))			Indoors, with open windows (dB(A))		
	Day-night	Daytime	Night-time	Day-night	Daytime	Night-time
Rural Districts	45	45	35	35	35	25
Suburban districts with little road traffic	50	50	40	40	40	30
Urban districts	55	55	45	45	45	35
Urban districts with one or more of the following: Workshops; business premises and main roads	60	60	50	50	50	40
Central business districts	65	65	55	55	55	45
Industrial districts	70	70	60	60	60	50

During the afternoon (between the hours of 16.00 and 16.45), noise levels in the area surrounding the proposed site are the loudest and exceed the recommended levels for urban areas (see Table 17) and on two sites, exceed recommended levels for industrial districts.

It is acknowledged that since the noise monitoring was undertaken, the construction and operation of the first phase of the port expansion project has been undertaken, and therefore it is likely that noise levels will exceed this original baseline as a result of an increase in traffic from operational activities. Noise emissions currently originate from the moving of containers, both during the day and at night hours, and the movement of construction vehicles along Atlantic Street. The trucks used to transport the salt from the Salt Works also contribute to the noise levels along 5th Road.

It is unlikely that noisy construction activities at the Harbour will be heard at the sensitive receptors around the site due to the distance, wind direction and structures between source and receptors. The baseline is therefore influenced by traffic along the roads travelling to and from the Harbour and the existing waterfront. It is assumed that an increase in traffic to and from the Harbour has occurred since the completion of the first phases of the Namport Container Expansion project. Therefore, the baseline along Atlantic Street and 5th Road is likely to be greater than those recorded in Table 16. Noise levels along KR Thomas Street and other residential roads are anticipated to be lower and probably no more than 55dB(A), the outdoor levels to be used as a guideline for a mixed urban district.

6.16 LANDSCAPE AND VISUAL AMENITY

6.16.1 LOCAL LANDSCAPE

Walvis Bay is situated on the Namib Desert coast at the confluence of the Southern Atlantic Ocean, the Namib Sand Sea, the gravel plains of the central Namib Desert and the Delta of the ephemeral Kuiseb River. The Walvis Bay area is characterised by this complex and dynamic environment; the Dune Belt, the Bay area, the Lagoon and the Northern Namib Dune sea providing key features of the landscape. The landscape has changed over the years due to natural and man-induced processes and will continue to do so as a result of population increase and town development.

The rolling hills and dunes surrounding the town are no higher than 100m and the town area lies approximately 6m above sea level (Date and Time Info, 2017). The site for the proposed project is relatively flat, with an elevation of approximately 1mMSL.

The town is relatively flat with the buildings no higher than three stories. The Harbour area dominates the landscape with large vessels, cranes and other infrastructure, and stacked containers.

The surrounding area around the site is residential to the south, east and north-east; the majority of properties being two stories or less. Vegetation including trees line the streets in areas. To the north of the site is the Namport container terminal, where containers are stacked around four to five containers high. During the preparation of this ESIA report, six port container cranes were delivered by sea and are to be established on the new phase 1 Namport Container Expansion area (Gelderbloem, 2018). These cranes are approximately 125m and therefore will alter the landscape and seascape character of the area, which will be visible from the proposed project site and surrounding residential properties.

The Raft is a dominating feature in the seascape and the Protea hotel and other smaller developments contribute to the seascape character. From the Raft and coastline, the tidal flats can be seen a low tide.

6.16.2 RESIDENTIAL VIEWS

Residential properties along KR Thomas Street and 4th Road overlook the proposed project site (see Figure 39), which is currently a green space with recreational facilities. Some properties are multi story and have views onto the proposed project site. Properties along Esplanade overlook the Lagoon.

Figure 39 -View across the cricket oval from KR Thomas Street / 4th Road

6.16.3 LIGHTING

Artificial lights illuminate the area at night. Streetlights come on just prior to sunset and remain on until sunrise (see Figure 40).

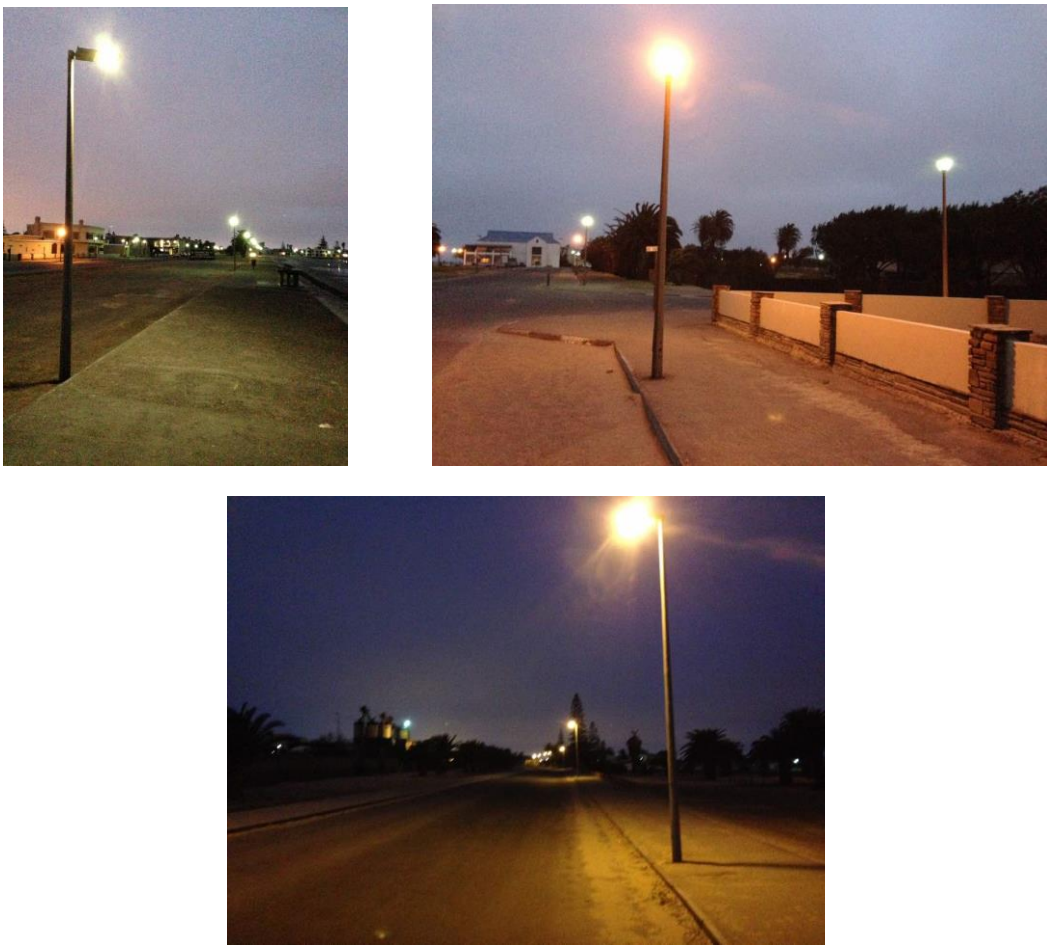


Figure 40 – Examples of street lights around the proposed project site

Facilities on the site are illuminated by tall floodlights (see Figure 41). Namport is very brightly lit and can be seen from a distance (see Figure 42).

Figure 41 – Existing Facilities on the proposed project site at night

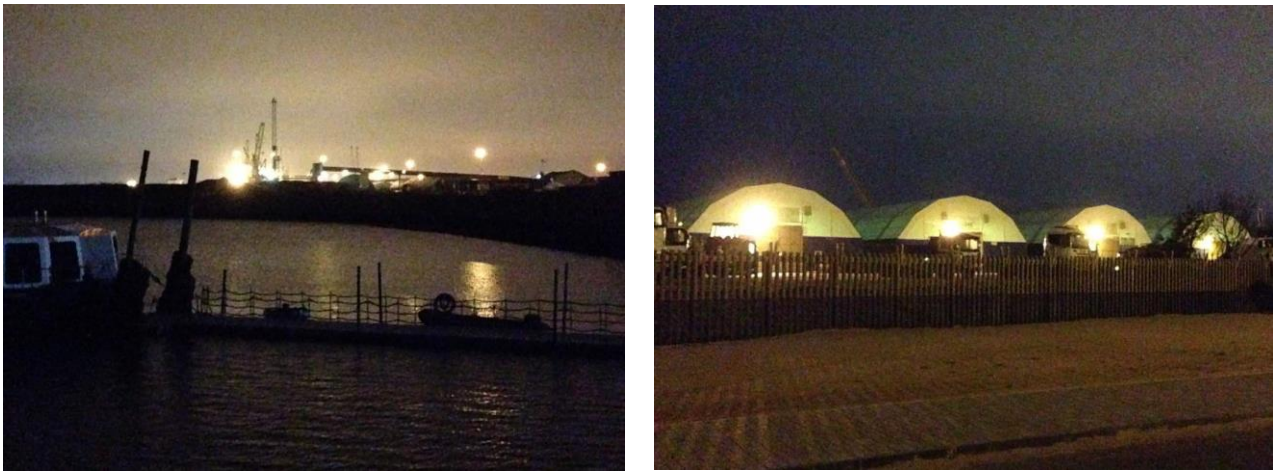


Figure 42 – Namport lighting at night

6.17 Climate and Meteorology

The climate of Walvis Bay is driven by a combination of atmospheric and marine conditions, namely the South Atlantic Anticyclone or high-pressure system, the northward-flowing cold Benguela Current and the divergence of the south-east trade winds along the coast.

The general weather changes from cool, foggy, windy and hyper-arid conditions along the coast. Extremely low rainfall (8 mm/yr), characteristic of the harsh desert environment, is moderated by coastal fog that creeps as far as 70km inland and contributes 35 - 45mm of precipitation per year to the coastal area (Enviro Dynaics, 2012; Uushona and Makuti, 2008; Heather-Clarke, 1996).

There are on average 150 foggy days per annum in the Walvis Bay-Swakopmund region, mostly between April and August. The fog attracts and accumulates pollutants. Although the winds are typically strong and hence disperse air pollution, sea breezes present in the lower atmosphere tend to blow pollution back landwards. Stable air conditions result in temperature inversions in the lower atmosphere and pollutant dispersal is limited to the coastal belt. These factors exacerbate the odour pollution problems experienced in Walvis Bay town (Preston-Whyte and Tyson, 1988; Heather-Clarke, 1996).

The Benguela coastal region is characterised by hot, dry adiabatic “berg” winds blown in off the western escarpment when high-pressure cells form over the subcontinent in winter. These winds are locally intensified by topographic features such as river valleys, blowing in excess of 50 km/h and causing severe sandstorms that considerably reduce visibility both at sea and on land.

Satellite imagery reveals that the berg winds transport significant quantities of terrigenous material far out to sea (Figure 43). Although berg wind conditions occur only intermittently, they last for up to a week at a time. The winds strongly affect the local temperatures, which are often above 30°C during “East wind” periods. The warm air associated with Berg winds flows over the cold marine boundary layer after passing over the coast. Land-sea breezes blow along coastal areas adjacent to interior coastal plains, resulting in a strong diurnal rotary wind component (Stuut, 2001; Jury et al, 1985). This dynamic wind regime influences most biotic and abiotic processes within the Walvis Bay area by changing sedimentation rates, upwelled nutrient flux and primary production within the system.

Figure 43 - Dust and Hydrogen Sulphide (green) along the Namibian coast (Source: NASA, 2010)

The windiest month in Walvis Bay is July, followed by January and December. The prevailing wind directions for these months are illustrated in Figure 44 and Figure 45. Data gathered over a six-year period by Iowa State University, illustrates the general prevailing wind through the year is from the south-west-west (Iowa State University, 2018).

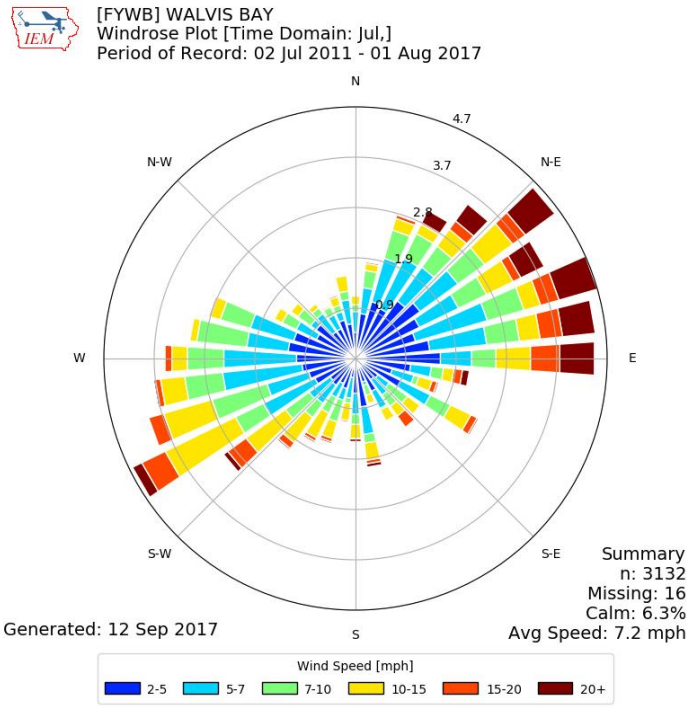


Figure 44 – July prevailing wind direction, Walvis Bay (Source: (Iowa State University, 2018))

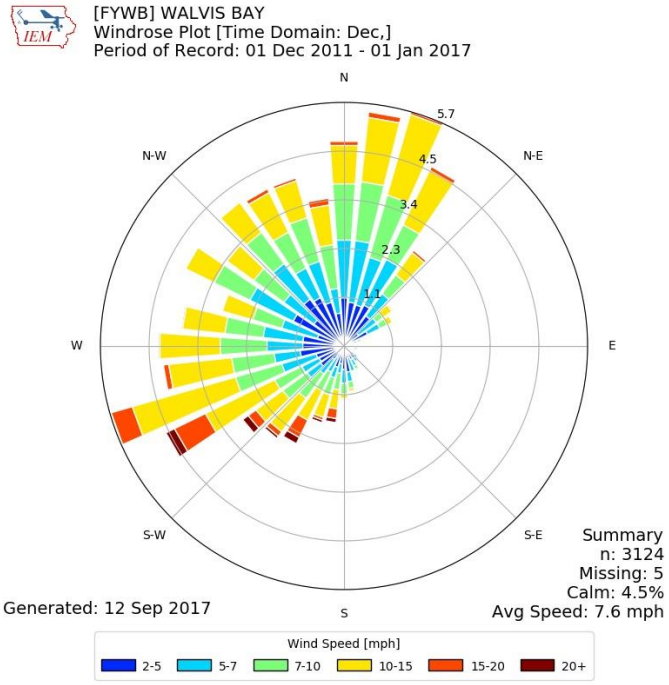


Figure 45 – December Prevailing wind direction, Walvis Bay (Source: (Iowa State University, 2018))

The average maximum temperatures in Walvis Bay are between 24°C in March - April and 19°C in September. Average minimum temperatures fall between 16.5°C in February and 9.1°C in August. Extreme hot events are experienced during some summers (December – February) when temperatures exceed 25°C.

6.18 Climate Change

Warming of the climate system is evident from observation of increases in average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level (Intergovernmental Panel on Climate Change, 2007).

Sea levels have risen between 1993 and 2006 by 3.3+/- 0.4mm/yr and are expected to continue for centuries due to the timescales associated with climate processes and feedbacks. Projections of sea level rise by the Intergovernmental Panel on Climate Change (IPCC) show that the rise of global average sea level by 2100 will be in the range from 0.18 to 0.59 m depending on the emissions scenario (Intergovernmental Panel on Climate Change, 2007).

Southern Africa is estimated to have a temperature increase of between 1°C and 3°C by 2050, mean sea surface temperatures are anticipated to increase between 1.5°C and 6°C by 2100, and a 10 to 20 percent decline in rainfall is anticipated by 2070. Climate change projections for Walvis Bay include a 0.2m rise in sea level and an increase in storm surge events (J. Josefsson, 2012).

6.19 Groundwater

Walvis Bay lies on a small zone with a productive porous aquifer, the Kuiseb aquifer, which is considered as one of the most productive aquifers in Namibia. The underground water from this aquifer is of good quality, with less than 1,000 mg/l of dissolved solids (Mendelsohn, 2003).

Walvis Bay obtains fresh water from the Central Namib Water supply scheme based in Swakopmund. The scheme is run by NamWater and draws groundwater from borefields in the Omaruru and Kuiseb rivers (Christelis et al., 2011).

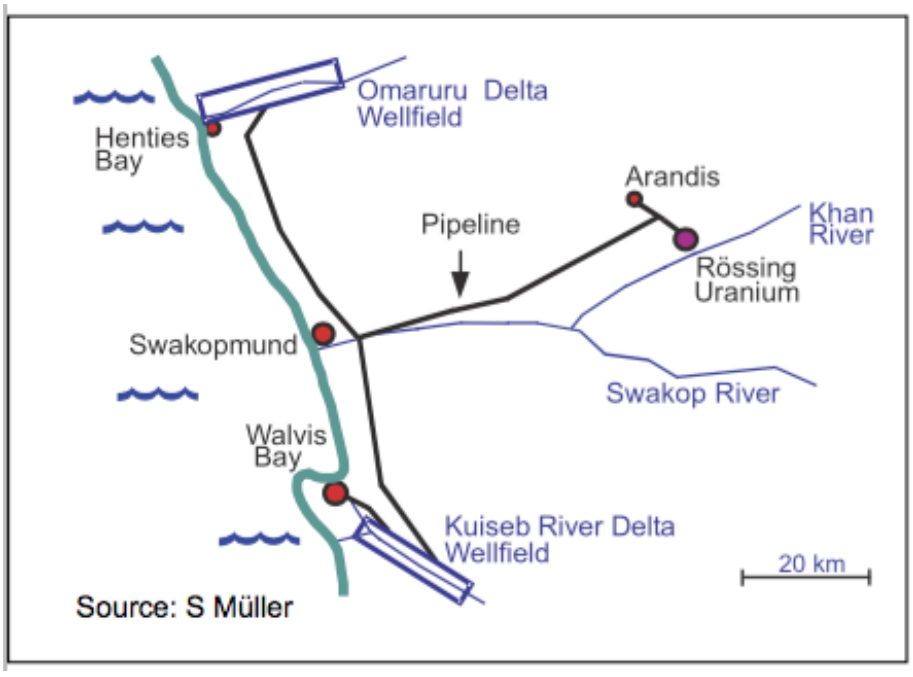


Figure 46 – Wellfields and pipeline networks of the coastal area. Image courtesy of **(Christelis et al., 2011)**

The alluvial aquifer in the lower part of the Kuiseb River at Rooibank has been used since 1923 to supply water to Walvis Bay. In 1966, the Rooibank B Area was developed and in 1992 an additional wellfield at Dorop South, closer to the coast, came into operation. Another wellfield was established at Swartbank upstream of Rooibank in 1974 to

supply Swakopmund and Rössing Mine. In addition to 53 boreholes in the Kuiseb wellfields, there is one large-diameter, horizontal filter well (Fehlmann well) (Christelis et al., 2011).

The alluvium in the Kuiseb River is 15-20m thick. Its relatively high permeability allows high pumping rates and quick recharge in case of floods. The IUSDF (Walvis Bay Municipality, 2014) estimates that the sustainable yield for the Kuiseb River is 7.2 million m^3/annum, although indications suggest that this is high. Pressure on this water source is increasing as a result of urbanisation and population growth. It is estimated that by 2030, approximately 13.8 million m^3/annum will be required.

6.20 Local Groundwater

The water table on the proposed project site was encountered during the geotechnical investigation (GEOSTRADA , 2016) at an average depth of 1.3m throughout the site. The groundwater is expected to be saline and not extracted for local use.

6.21 Flooding

The Kuiseb River, when flooded reaches the sea approximately every 10 years. During these events, flooding in areas around Walvis Bay occurs as a result of a tributary which enters the town from the south-east. In 1961, a flood barrier was built at Rooibank to contain the river and prevent flooding via the route, and has proven effective in 1963 and 2011. Potential remains for flood water to reach the Lagoon via the southern tributary, however in the past this has been dissipated by the porosity of the delta, which soaks up the flood and prevents the break-out to sea (Namibian Ports Authority, 2013).

6.22 Site Geology

The geotechnical survey (GEOSTRADA , 2016) conducted to investigate the underlying geology, concludes that the entire site comprises of the same stratigraphy: from surface to a depth between 0.15 and 0.6m consist of a layer of imported material, which is pale yellowish orange, medium dense to dense consistency, coarse sand and gravel. From an average depth of 0.3m to and average depth of 1.3m is transported sand (windblown).

6.23 The Marine Environment

This section describes the environmental features that directly interact with the marine environment, which includes the subtidal area (below low-tide mark), inter-tidal area (foreshore and seashore) and coastal zone (areas of land which border the marine environment).

6.23.1 Walvis Bay and Surroundings

The coastline of central Namibia is dominated by sandy beaches, with rocky habitats being represented only by occasional small rocky outcrops. Biogeographically the central Namibian marine and coastal environment fall into the warm-temperate Namib Province, which extends northwards from Lüderitz into southern Angola. The wind-induced upwelling characterising the Namibian coastline is the principal physical process which shapes the marine ecology of the central Benguela region. The harsh aridity of the Namib coastline contrasts with the rich productive marine environment offshore (Delta Marine Consultants, 2010).

The Walvis Bay area is one of only three, west to north facing embayments in Namibia that provide significant wave shelter from the South Atlantic swell, the others being Lüderitz and Swakopmund. This natural marine shelter along with freshwater from the Kuiseb River and Kuiseb Delta to the south of the Bay resulted in seafarers settling in the area of Walvis Bay. American, British, Dutch and French whaling fleets also used the area for hunting whales in the surrounding waters, which contributed to the development of the town.

The key marine features of the Bay are, the deep-water bay and Harbour area to the east of the Bay; Walvis Bay Peninsula reaching up to Pelican Point; Walvis Bay Lagoon to the south; the Saltworks and Saltpans to the far south of the Lagoon (see Figure 32) and the intertidal areas (including the mudflats). The Lagoon, Salt Pans, the southern half of Pelican Point and the adjacent intertidal areas from the Walvis Bay Ramsar site.

6.23.2 The Lagoon

The Walvis Bay Lagoon play a fundamental feature of the Ramsar Site; it is the source of water which supplies the Salt Pans and provides an environment suitable for roosting and feeding for a significant proportion of the birds in the Bay area. The Lagoon can be divided into three zones (Danish International Development Agency , 2003):

- **Mouth:** The hydrodynamics of this area is dominated by the wave and tidal currents with little likely wind-blown intrusion of sand. This is the only access point into the Lagoon for marine mammals such as dolphins.
- **Central section:** The section of the Lagoon with the apparent wind-blown intrusion of sand extending approximately 50m from the dune field along the eastern shore.
- **Southern zone:** The flow and circulation in this area is limited and is therefore characterised by higher water temperatures and salinity, and is largely anoxic. The Kuiseb River mud is present, deposited during major floods. There is also a high organic load of fine detritus in the bottom sediments at the southern end of the Lagoon. This organic material is partly transported into the Lagoon from the Bay, and partly generated by biologic activity in the Lagoon.

Further detail regarding the Lagoon environment is discussed in the next sections.

6.23.3 Anthropogenic Influences in The Bay Area

As discussed throughout this report, the Bay area has been developed substantially over the years and various activities and operations occur within the marine environment as a result. In brief, the following existing developments and activities influence the marine environment:

- **Salt Works:** The Salt Works is made up of various evaporation and concentration ponds, as described in Section 6.9.4. The Salt Works have profoundly changed the functioning and ecology of the Lagoon area,

particularly in the southern end. Land reclamation and the construction of physical barriers to the tidal dynamics have resulted in decreased circulation and accompanied siltation and lowering of water clarity and quality with increased temperatures and salinity. Some of the natural wetland and Lagoon area has been reclaimed for use as evaporation ponds. Access roads have been built which cut off tidal circulation to the southern extremity of the Lagoon (Appendix J).

- **Fishing Industry / Factories:** The activities associated with the fishing industry been active in the in the harbor area for over 50 years and will continue to operate and potentially grow. The fish processing plants in Walvis Bay draw process water from the bay and also discharge effluent into it. However, because of the frequently anoxic status of the receiving waters, the discharge of high BOD waste has become problematic. While it is advantageous for these factories to discharge into the Bay it is clear that the effluent is compounding the already oxygen-stressed condition of the Bay, particularly along its eastern shore (OLRAC, 2009).
- **Namport Operations**: Namport has been operating since the early 1900's, and during this time considerable development and various changes to the natural environment has occurred, including but not limited to:
    - In 2000, the harbour was deepened (Delta Marine Consultants, 2010); and
    - Annual maintenance dredging is undertaken for the entrance channel, turning circle and tanker basin. Over 2,000,000m^3 of material is dredged from the sea floor (Namport, 2006), which is removed and transferred to one of three off-shore sites in the Bay area (Appendix J). These dredging operations have led to an increase in suspended solids in the Bay area.
- **Namport Container Terminal Expansion project**: As discussed in Section 6.9.2, phase 1 of the Container Terminal Expansion project is almost complete after two and a half years of construction works. Direct and indirect influences include, but are not limited to:
    - Bottlenose dolphins were observed to move north during the phase 1 of the Namport Expansion Project (see Section 6.1.2.14);
    - The construction of phase 1 has led to an increase in suspended solids in the Lagoon which has directly impacted the bird population (see Section 6.1.2.15); and
    - Due to the type and location of the new port structure, the refreshment rates in the Lagoon may have reduced. Studies undertaken to date are not consistent and some uncertainty remains, however it is considered likely (Namibian Ports Authority, 2013).
- **Tourism**: Tourism is one of the fastest growing industries in Walvis Bay and is predicted to grow nationally (see Section 6.15.9). The Bay area and in particular the Lagoon attract tourists for the bird and marine life. In addition, recreational activities in the Lagoon area include fishing, kayaking, sailing, wind-surfing and kite-boarding. The direct and indirect impacts of tourism activities include but are not limited to pollution and waste, noise, human-animal interaction, increased water activities, and disturbing and injuring mammals.
- **Fishing**: Fishing in the Bay area is a popular recreational activity. There is potential that over-fishing and collection of bait species are contributing to the changes in the fish community structure and structure of the benthic and sessile organisms (respectively) in the Bay area (Appendix J).
- **Mariculture**: Two sites in the Bay area are being used for mariculture. Impacts from aquaculture and mariculture include pollution and the introduction of alien species. These farms also close off spaces previously accessible to wild marine life, possibly impacting habitat and feeding and breeding patterns. Bottlenose Dolphins have also been seen swimming between the lines of oyster farms and there is a danger of injury or death resulting from entanglement (Appendix J).
- **Town Development and expansion of residential areas along the Lagoon waterfront:** Development along the coastline has altered wave action which contributes to marine sediment.
- **Kuiseb river**: A diversion weir was constructed at Rooibank in the 1960's to contain the river and prevent flooding Walvis Bay. This has altered the natural flow of the river (when flooded). This has resulted in a reduction in the size of the Lagoon, exacerbated the sedimentation process and reduced nutrients being brought into the Lagoon from inland.

6.23.4 Oceanography and Hydrodynamics

Continental shelf circulation off Namibia is a result of the interaction of three gyral systems: the South Atlantic Subtropical Gyre, the Sub-Antarctic Gyre and the Subequatorial Gyre. The Benguela Current is regarded as the eastern boundary current of the South Atlantic Gyre. North of Walvis Bay, the current moves offshore away from the coast. The speed of the Benguela Current varies between 10 and 30 cm/s depending on the location off the coast and wind direction and speed. Appendix J provides further information about the ocean systems around Walvis Bay and Appendix 1 provides further information regarding the flow dynamic modelling.

6.1.1.5 Wind and Currents

The dominant wind direction in autumn, winter and spring is from the south-west. During autumn, gentle winds from the south also occur as do strong north-easterly “Berg winds” (see Section 6.17). In summer the prevailing winds are from the north-west to south-west with the latter predominating (Delta Marine Consultants, 2010). Wind roses are presented in Section 6.17.

The northward-flowing Benguela Current and its associated upwelling results in nutrient-rich water being flushed into the Bay and the Lagoon. Water circulation in the Bay takes place mainly in the upper layer and depends on the direction of the wind. The dominant south-westerly winds create a clockwise water flow in the Bay during the morning, which travels southwards past the Harbour, and reverses later towards the north (see Figure 47). At Pelican Point the current is generally northward for the whole day. Bottom waters enter the Bay area at Pelican Point and surface layers exit at the same point.

Current speeds are found to be fairly constant with depth and are generally found to be very low, rarely exceeding 10 cm/s. This is consistent with the relatively small volume of the tidal prism, and also indicates only a small wind-driven circulation. An exception is at Pelican Point, which is subject to a highly three-dimensional current field due to the local bathymetry and the wave induced longshore current on the ocean side of Pelican Point (Danish International Development Agency , 2003).

The fastest current speeds in the Lagoon mouth area are focussed in the deep channels where they reach 1m/s, whereas over the shallow sandbanks the current speeds are below 0.3m/s, and in the more subtle channel reaches are 0.4-0.5m/s (Namibian Ports Authority, 2013).

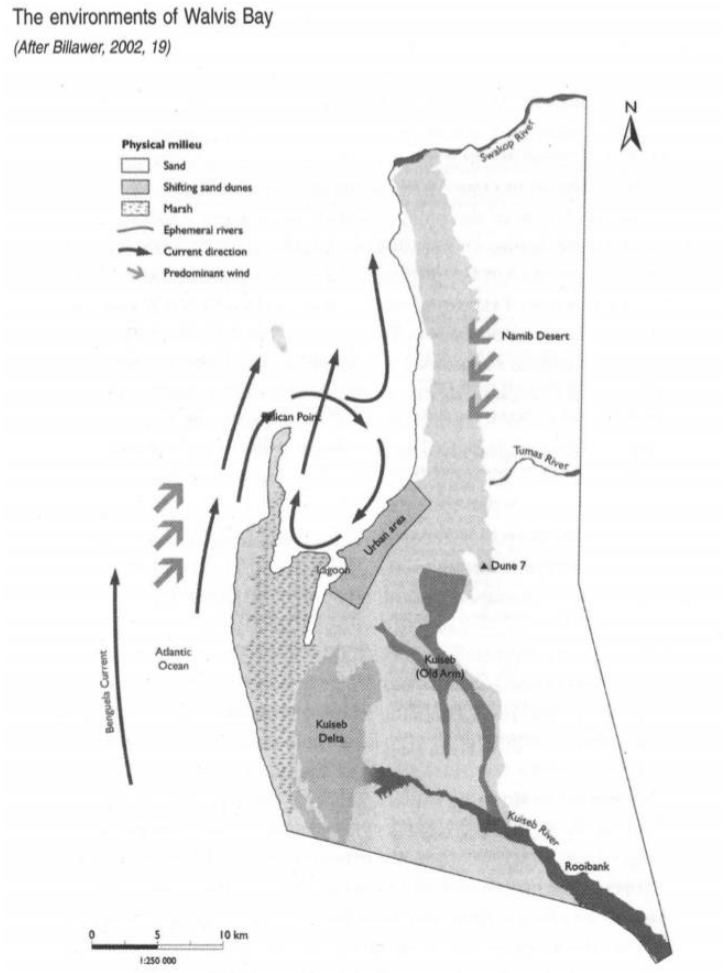


Figure 47 - The currents around Walvis Bay Source: (Silverman, 2001)

Since the development of the first phase of the Namport Container Expansion project, the refreshment rates of the Lagoon have altered slightly compared to rates prior to the development; however, a direct comparison study and use of real data of the flow before and after the development has not been undertaken. This assumption has been derived from comparing modelling outputs in the Namport EIA Hydrological Study (Delta Marine Consultants, 2009) and the hydrological modelling undertaken for the proposed development (Appendix I).

6.1.1.6 TIDES AND WAVES

Tides along the Namibia shelf are semi-diurnal with an average tidal range of between 0.5 and 1.3m and up to 1.6m range between mean spring lows and mean spring high tides. The mean spring tidal range for Walvis Bay is 1.42m (0.27m – 1.69m), while the mean neap tide is 0.62m (0.67m – 1.29m). Variations in the absolute water level as a result of strong winds and big waves can, however, occur adjacent to the shoreline, resulting in differences of up to 0.5 m from the tidal predictions (Environ Dynamics, 2010). (CSIR, 2009).

Although the mouth of the Lagoon is protected from the south-westerly waves by Pelican Point, waves occur in the shallow zone. The waves and the wave set-up progressively decrease in magnitude southwards in the shadow zone. This results in a southwards-setting longshore current in the harbour (Delta Marine Consultants, 2010). The Lagoon is becoming shallower due to siltation, which is arising due to various influences (see Section 6.23.6).

The Bay and Lagoon are flushed twice daily with nutrient-rich water from the open ocean. There is a relatively large degree of mixing of Lagoon and Bay water, however, due to its shallowness and dynamic nature, the water

temperature and salinity within the Lagoon vary across special and temporal scales (Appendix J). The refreshment rates in the Lagoon may have reduced since the development of the first phase of the Namport Container Expansion project; studies undertaken to date are not consistent and some uncertainty remains, however it is considered likely and therefore assumed for the purpose of this report (Namibian Ports Authority, 2013).

6.1.1.7 FLOW CONDITIONS AT THE LAGOON MOUTH

The flow pattern in the immediate vicinity of the Raft Restaurant is slightly deflected both during ebb and flood (see Figure 49). During ebb flow, an eddy is formed on the shallows just south of the Raft restaurant. The main ebb flow is conducted through the eastern tidal channel. The (artificial/dredged) western channel is inactive. In contrast, the flood flow is distributed over the entire entrance section.

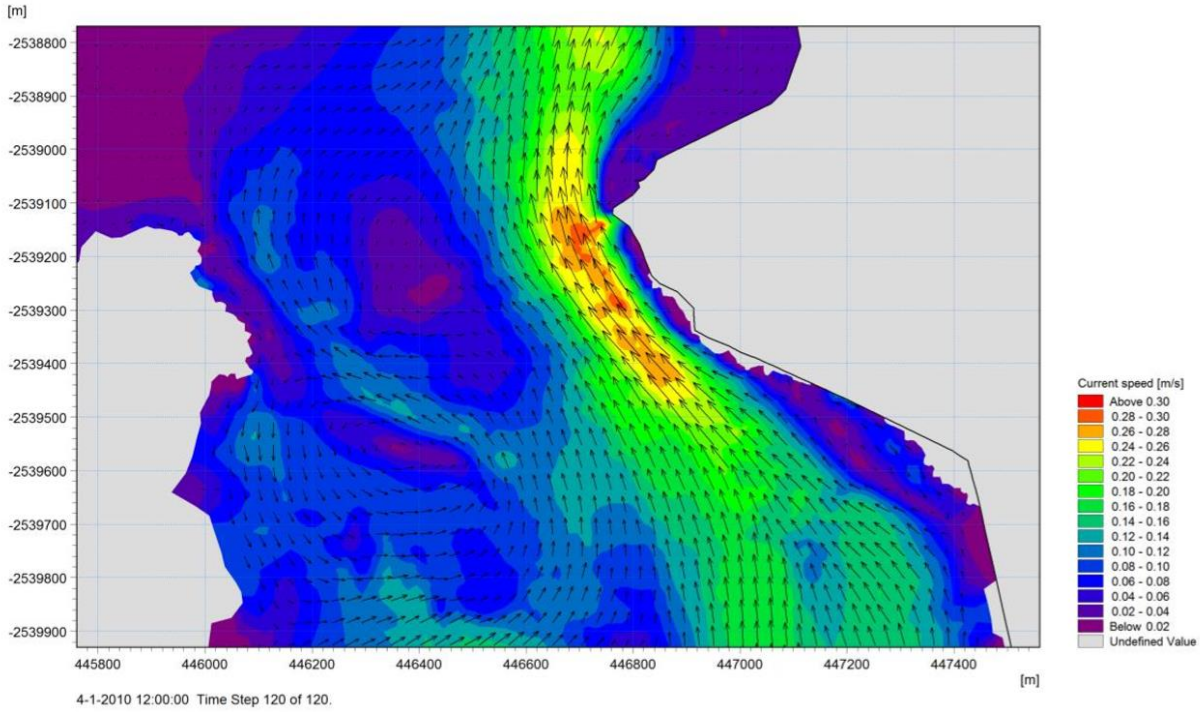


Figure 48 – Typical ebb current pattern (Appendix I)

6.1.2 BATHYMETRY

A prominent berm on the upper beach stretches along much of the coastline surrounding Walvis Bay. From the berm, the beach slopes gently to the low water mark. At around 1-2m deep, the slope flattens, and the sandbank is replaced by gently sloping, low relief rocky seabed, which extends approximately 400m offshore to about the 5m isobath (depth contour). Seaward of the 10m depth contour, the seabed is dominated by a gently sloping flat featureless sandy area (Delta Marine Consultants, 2010).

In Walvis Bay, the water depth ranges from -20 m chart datum (CD) at Pelican Point to approximately -2.5 m CD at the entrance to the Lagoon during high tide (Danish International Development Agency , 2003) (see Figure 49). The Bathymetric survey carried out in June 2017 provides detailed bathymetric for the areas of the Lagoon entrance and around the proposed project site (see Figure 50).

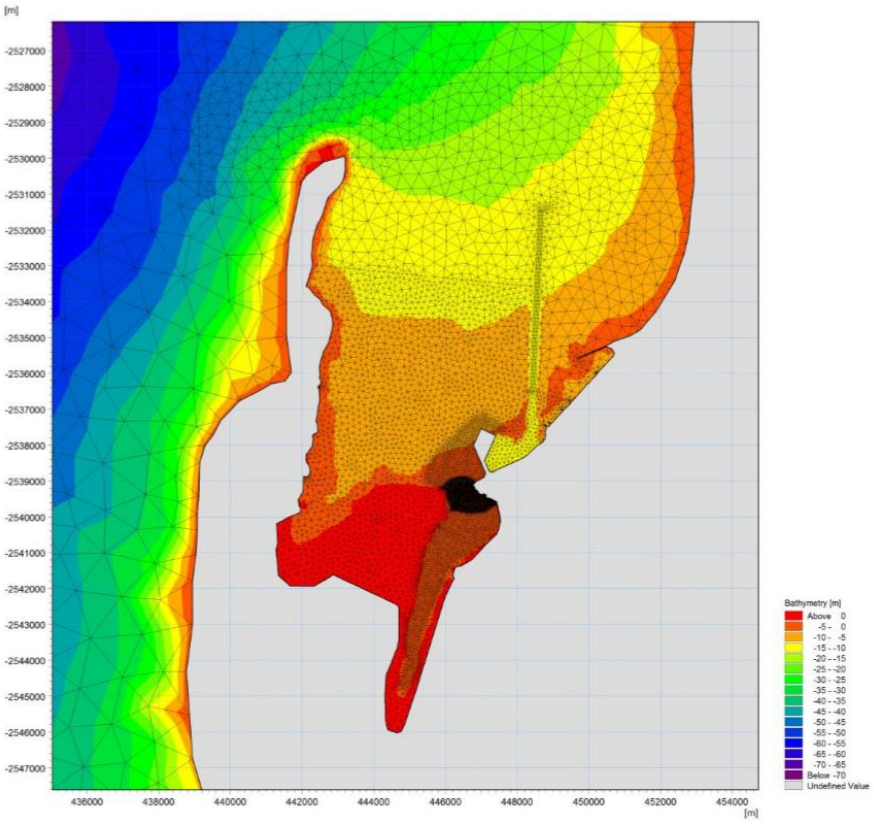


Figure 49 - Walvis Bay Bathymetry (m)

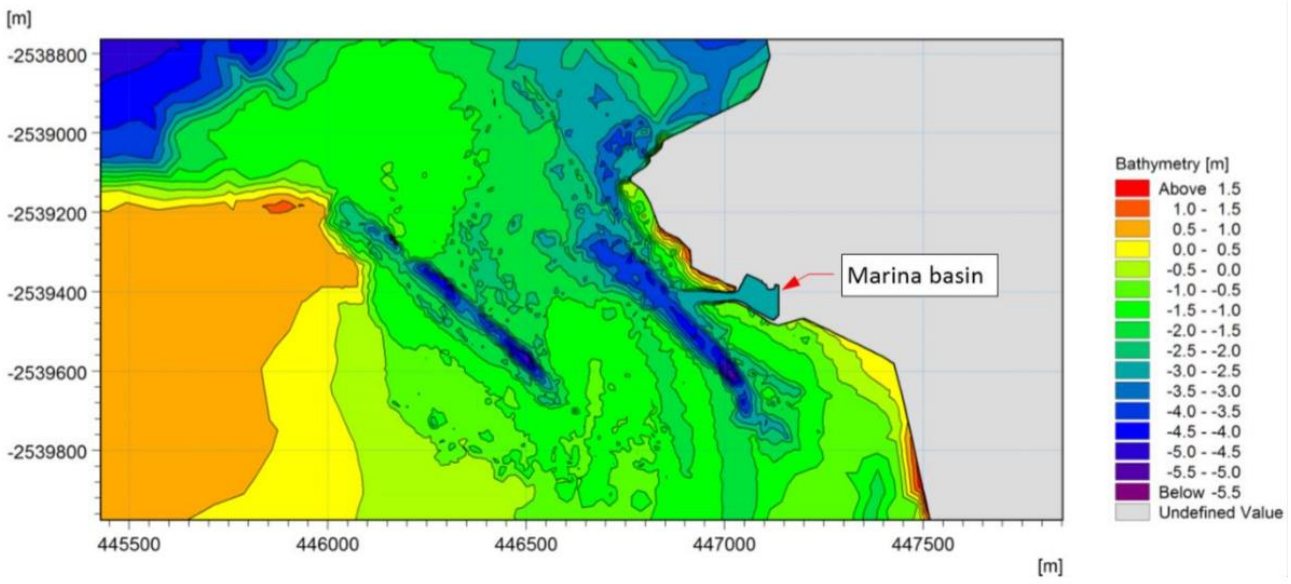


Figure 50 - Sea bed levels (MSL) around the proposed waterfront development

The southern and eastern boundaries of the Lagoon area have been radically modified by the development of saltpans and associated building of roads. Within the saltpans, there is no diurnal fluctuation in water levels. Fluctuations in water levels within a pan are relatively small; there is great variation in salinity between pans as the water is pumped from one evaporation pan to the next (Simmons RE, 2015).

The bathymetry in the Lagoon entrance is considered most relevant for the flow conditions and water exchange between Lagoon and Bay, which is relevant to the proposed project. The western channel (as seen as the left dark blue in Figure 50) is ineffective for tidal flushing and is likely to fill-in over time, whereas the eastern channel is self-scouring and not currently under threat (Namibian Ports Authority, 2013).

The Lagoon bathymetry has not altered significantly between 1987 and 2013; where shallowing has occurred, it is most likely as a result of the deposition of organic matter (see section 6.23.6). The steepening of the flood tide front due to shoaling is reported as a probable cause for the transport of the material to the south within the Lagoon. The organic material is light and more readily transported than sand. Once at the south of the Lagoon, the very weak tidal flushing in that area is unable to remove this material and settling occurs (Namibian Ports Authority, 2013).

6.23.5 Geomorphology and Coastal Dynamics

The coastal area in the Walvis Bay area, including Sandwich Harbour, is an extremely dynamic and changing coastline due to wave action, currents and the wind.

6.1.2.1 Walvis Bay

The Walvis Bay Peninsula has had little anthropogenic change, however, is geomorphically dynamic. South of Donkey Bay, the coast is impacted by high energy, long period swells from the southwest causing huge quantities of sediment to be transported along the beach to the north, resulting in longshore deposition of sediment causing the Peninsula to change in shape and extend in length over the years (Simmons RE, 2015) (Namibian Ports Authority, 2013). The Peninsular is narrowest at Donkey Bay, which is at risk for a breach to occur, severing the northern part of the Pelican Point peninsula from the mainland. If a breach occurs, it is assumed that it will close within a short period of time due to the high sedimentation rate in that area (Walvis Bay Municipality, 2008). Appendix J provides further information on coastal sedimentation.

The mouth of the Lagoon has not significantly altered since 1987 and is considered to be stable with no trend of bed level changes. The eastern channel has slightly shifted to the east in 2012 and 2013. The Lagoon sandspit (the mouth area) has undergone some changes over the years, which appear to be naturally driven by wave and sediment supply from the west (see Section 6.1.2), which accumulates at the Lagoon entrance. The sandspit has grown over the years, but the growth rate has slowed down between 2007 and 2013 and seems to stabilise (Namibian Ports Authority, 2013).

6.1.2.2 Sandwich Harbour

Whilst outside the study area, it is important to document an example of the dynamics of coastline in an area that has had had minimal anthropogenic influence. During the 1970s the northern section of Sandwich Harbour was an extensive system of tidal mudflats, which drained brackish and freshwater pools. At its widest point, the beach was about one kilometre from the base of the dunes. Twenty years later, 1992, the sea has pushed back the beach towards the dunes, covering large portions of the vegetation with a blanket of wave-washed sand. Only a narrow channel still drains the pools at the far (southern) end. By 1997 the beach has closed against the dunes in the south and no tidal flow is possible. The vegetation is dying from increased salinity and the beach broadens as it moves closer to the dunes (Jenkins, 2015).

Figure 51 – Costal changes of Sandwich Harbour between the 1970s and 1997 (Source: (Jenkins, 2015) & Google Earth)

In more recent years, changes are also evident, illustrating the constantly changing coastline of the Walvis Bay area.

Figure 52 – Changes to Sandwich Harbour in the last eight years

6.23.6 SEDIMENTATION AND SILTATION

Sedimentation and siltation in the Bay area occur as a result of natural processes and anthropogenic influences. The sediment transport inside the Bay is driven by wind generated and tidal currents. The sand transport might be further influenced by waves (Delta Marine Consultants, 2009). The next four sections provide further details on sedimentation and siltation.

6.1.2.3 NATURAL INFLUENCES

The movement of sediment within the central Namibian coastal region involves a dynamic interaction between land and marine components. The complex nature of the sedimentary environment within present-day Walvis Bay is a result of both fluvial and marine deposition over the past 6,000 years, as well as being impacted by the high productivity of the Benguela Current.

Due to the Benguela current, the background levels of suspended matter in the Bay area is considerable. Currents entering and flowing from the Lagoon carry sediments that are deposited, mainly at the mouth of the Lagoon. The natural shoaling processes of the tidal wave within the Lagoon causes the net inward transport of particulate organic matter, resulting in muddy sediments in the inner Lagoon, with high concentrations of organic matter and nutrients (Danish International Development Agency , 2003).

Modelling undertaken through the Agenda 21 studies (Danish International Development Agency , 2003) illustrates that it is likely that suspended solids enter the Lagoon from the Bay occurs during situations with a northerly wind. On land, the prevailing south-westerly winds drive sand northwards onto barchanoid dunes which flank the eastern side of the Lagoon. This sand at a rate in the order of 5,000m^3/yr, reaches the Lagoon which contributes to sedimentation, a small amount when compared to the tidal prism of the Lagoon, which is 4.3 million m^3 (Danish International Development Agency , 2003) (Namibian Ports Authority, 2013).

The natural flow of the southern arm of the Kuiseb river has been altered over time through the build-up of dunes and anthropogenic changes. This has resulted in a reduction in the size of the Lagoon and exacerbated the sedimentation process (Silverman, 2001).

6.1.2.4 HUMAN ACTIVITIES AND SEDIMENTATION

The Bay area has seen various development and human activities over the years: the growth of the town and the expansion of residential areas along the eastern shores and construction of hard structures of the harbour reduce wave action which contributes to a reduction in marine sedimentation; the Saltworks established in the 1960's, has resulted in a reduction the tidal sweep, possibly contributing to siltation; and each year, Namport dredge the Harbour entrance channel (see Figure 49), turning circle and tanker basin, resulting in excess of 2,000,000m^3 of sediment (Namport, 2006) which is dumped at one of three sites within the Bay area.

6.1.2.5 DECAYING ORGANIC MATTER

In addition to meteorological, hydrological and human influences, natural sedimentation occurs as a result of the rich nutrient Benguela Current. Phytoplankton that takes up the nutrients provided by the Current is grazed by the zooplankton. Due to the large quantities of phytoplankton, a large proportion is not grazed and settles on the seafloor. These settled particles metabolise in the sediment causing an accumulation of anaerobically decaying phytoplankton at depths around 3 – 4m. This rich organic sediment has a high oxygen demand and is usually anoxic (depleted of dissolved oxygen). As a result of further decay, toxic hydrogen sulphide is released into the sediment (see Section 6.23.10 for sulphur eruptions), which bubbles into the water column and turns it anoxic (Appendix J).

6.1.2.6 THE LAGOON AND SEDIMENTATION

The combination of these natural and anthropogenic changes results in the Lagoon accumulating sediments. The studies undertaken for Agenda 21 (Danish International Development Agency , 2003), document that over the past 14 years, sedimentation has mostly occurred in the tidal channels. This is however not solely as a result of wind-blown transport as the wind-blown transport only affects the Lagoon edge. There is a high organic load in the bottom sediments at the southern end of the Lagoon that does not appear to have a wind-blown source. This organic material is partly transported into the Lagoon from the Bay, and partly generated by biologic activity in the Lagoon. These deposits might partly result from the stronger flood tide flows in comparison with the ebb tide flows.

The development of the first phase of Namport's Container Expansion project is believed to have resulted in an increase in sedimentation in the Lagoon (see Figure 53). This increase is resulting in indirect impacts, namely on bird number in the Lagoon (Appendix H) (see Section 6.1.2.15 for further information). This change could be one of the factors negatively affecting the local flora and fauna and illustrates how the Lagoon is susceptible to changes in the Bay, either human or natural influences.

It should be noted, that this event presented in Figure 53 is unrelated to a potential naturally occurring sulphur eruption.

Figure 53 – Google Earth images (august 2014 and January 2015) indicating conditions after the development of the phase 1 of the Namport Container Expansion project (Source: Appendix H)

6.23.7 MARINE SEDIMENTS

Coarse and medium sands are found near the mouth of the Lagoon, with fine, muddy sediments at the central and southern end. The inter-tidal flats have increased, and sub-tidal areas have decreased, due to progressive siltation. The harbour has a soft substrate/mud sediment bottom with depths up to 15m (Walvis Bay Municipality, 2008).

A thick, pungent, dark green diatomaceous ooze overlies fine to medium sand that has accumulated in sheltered parts of the Bay at depths below -3 to -4 m. Integrated sedimentary components of silt, diatomaceous muds, aeolian and marine sand trap organic-rich material containing naturally high concentrations of heavy metals. The organic-rich sediments have a high oxygen demand and can become anoxic. See Appendix J for further details.

The Lagoon sediment is high in organic matter, which may lead to higher levels of a number of environmental contaminants. Chemicals like phthalic anhydride, phenol, methylphenols, and indole are found in Lagoon sediments

(Delta Marine Consultants, 2010). Concentrations of heavy metals were detected within the Bay and Port area sediments, especially in and around the fish processing factories (Municipality of Walvis Bay, 2003). The concentrations of metals in the sediment of the Bay area are generally of the same order of magnitude as other harbours around the world. Cadmium levels are elevated; its toxicity is inversely related to salinity, and in an anoxic environment like Walvis Bay, its potential impact is reduced. See Appendix J for further details.

In the Lagoon, samples of marine sediments have been analysed (Namport, 2006) and results show that concentrations of heavy metal were found to be below the threshold effects limits (TEL), the limit where adverse biological effect usually or always occur. Sediment samples in the Lagoon also confirmed that sediments are below the 'effect range low' (ERL), the value of contaminants with an unlikely occurrence of biological effects. Both of these threshold values (ERL and TEL) have been recommended as quality limits by BCLME.

The concentrations of metals in sediments found in the Bay area and Lagoon are illustrated below. A graph illustrating concentrations of cadmium in sediment from the Lagoon and Bay area compared with threshold values adopted by BCLME is illustrated in Figure 55.

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Table 3-6 Concentration of metal in sediment samples mg/kg dw and for TBT mg/kg ww (COWI, 2003a, BCLME)

	As	Hg	Cd	Pb	Mn	Cu	TBT
Port Berth 8	9.81	0.25	6.46	195.16	105.06	119.42	0.04
Port Berth 7	7.85	0.33	5.85	117.42	109.83	54.84	<0.02
Port Berth 5	5.43	0.33	1.75	74.86	81.56	71.69	-
Port Berth 2	3.71	0.32	1.69	31.02	66.03	45.34	0.07
Fishing Port Outside Etosha	5.28	0.49	5.21	228.61	154.45	54.77	<0.02
Lagoon Line 3 Channel	2.76	0.28	0.44	9.36	37.59	9.02	<0.02
Lagoon Line 3 Middle	3.29	0.27	0.41	8.34	46.43	7.65	<0.02
Lagoon Line 3 Dry	1.45	0.25	0.16	4.83	44.50	4.88	-
Lagoon Line 5 Channel	2.57	0.33	0.29	2.26	19.62	2.51	<0.02
Lagoon Line 5 Middle	2.91	0.29	0.32	4.80	31.12	4.88	-
Lagoon Line 5 Dry	9.05	0.12	1.82	42.79	137.41	41.56	-
Bay 6 m	6.48	0.26	6.09	87.13	116.69	46.86	<0.02
Bay 11 m	8.38	0.35	9.50	9.61	59.16	16.00	<0.02
Fishing Port inside breakwater	6.76	0.29	4.86	45.41	114.40	35.71	-
Fishing Port Middle	8.39	0.33	5.39	69.51	107.47	60.08	<0.02
Fishing Port South	6.01	0.34	4.44	32.65	94.28	25.66	-
At Syncrolift	3.80	0.22	2.02	28.01	64.29	47.55	<0.02
At Oil pier	4.29	0.29	2.37	21.49	75.70	16.53	<0.02
Average	5.5	0,30	3.28	56.29	81.42	36.94	-
ERL (BCLME recommended guide-line values)	8.2	0.15	1.2	46.7	-	34	0.005
TEL (BCLME recommended guide-line values)	7.24	0.13	0.68	30.2	-	18.7	-

Figure 54 – Concentrations of metal in sediment samples (Source: (Namport, 2006))

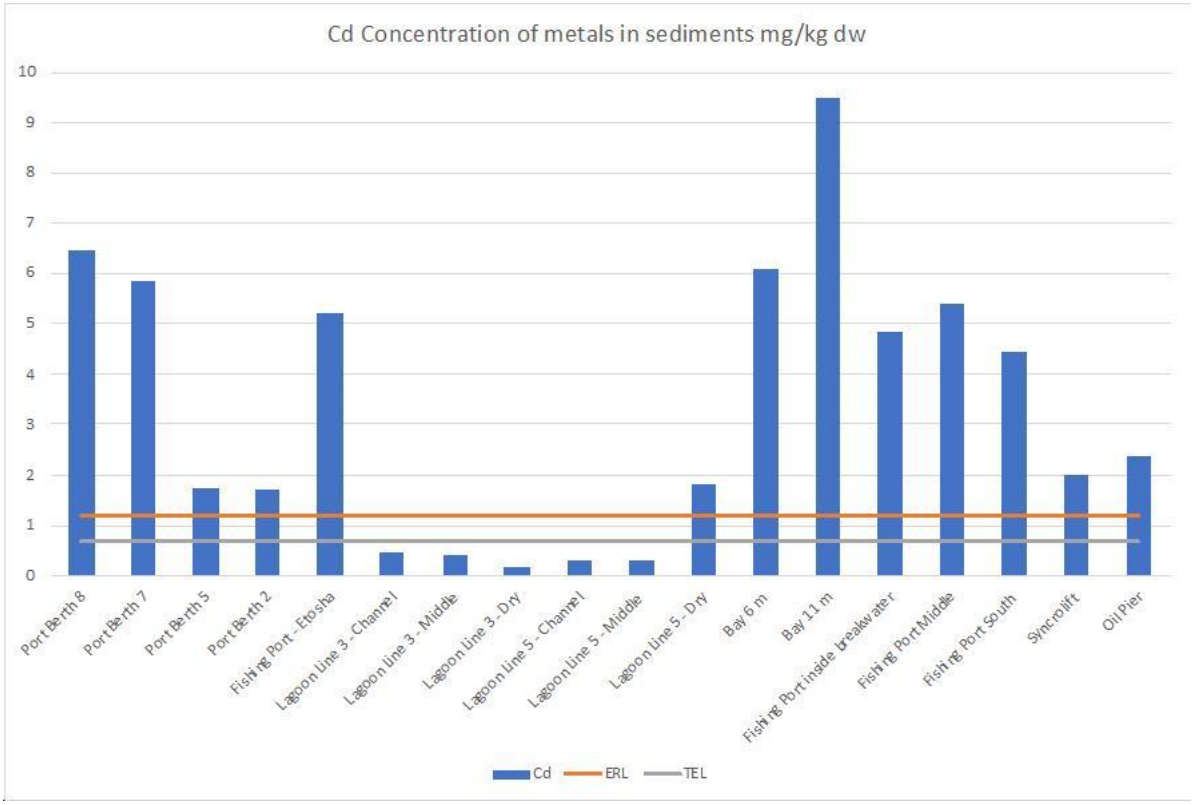


Figure 55 –Cadmium levels in sediments from the Lagoon and Bay area

6.23.8 WATER QUALITY

6.1.2.7 TURBIDITY

Turbidity is a unit of measure to determine concentrations of suspended solids (Section 6.23.6) and organic matter (see Section 6.1.2.5) in water, which is used as an indicator of water quality.

Water transparency deteriorates (i.e. increased turbidity) from Pelican Point towards the Bay, into the Harbour and further into the Lagoon. The suspended matter at Pelican Point is approximately 5mg/l and rises to 60mg/l in the southern part of the Lagoon (Delta Marine Consultants, 2010).

At Pelican Point the turbidity values are relatively high in the lower part of the water column. This indicates re-suspension of fine bed sediments, probably organic detritus (small particles of dead organic material), due to local wave and current conditions (Danish International Development Agency , 2003).

As part of the normal Namport operations, dredging of the entrance channel, turning circle and tanker basin is undertaken annually. Over 2,000,000m^3 of material is dredged from the sea floor, which is removed and transferred to one of three off-shore sites in the Bay area (Namport, 2006).

6.1.2.8 TEMPERATURE AND SALINITY

Lowest temperatures (approximately 12^{o}C) are found in the western, deep waters at Pelican Point, and highest temperatures (approximately 17^{o}C) at the shallow east coast and the mouth of the Lagoon. The temperature increase is due to the heating effect of solar radiation and the counter clockwise circulation in the Bay (Danish International Development Agency , 2003).

Variations of vertical salinity profiles in the Bay are very small. The Practical Salinity Unit (PSU) ranges between 34.8 and 35.5, with most values between the 35.1 and 35.3 range. A clear freshwater influence is found at the breakwater in the centre of the Bay on the east side and Bird Rock to the north-east side of the Bay, indicating an outflow of freshwater in the Harbour region. There is also no indication for outflow of high saline water from the Lagoon or for salinity stratification in the deeper areas of the Bay (Danish International Development Agency , 2003).

Due to its shallowness and dynamic nature, the Lagoon's temperature and salinity differ in different parts of the Lagoon and at different times. The limited flushing waters and organic loading in the southern section result in extreme conditions; surface heating and evaporation yield temperatures as high as 30°C and salinity values of 46 ppt in the southern-most tip of the Lagoon (University of Namibia, 2012). Bay water is found at the mouth, so salinity levels are much lower (Appendix J).

6.1.2.9 POLLUTION

The water quality of the harbour depends somewhat on the seasonally changing activity of the fish processing industry due to the discharge of organically polluted seawater and freshwater (Delta Marine Consultants, 2010). Pollution from fish factory effluent and commercial activities within the Harbour and surrounding area are thought to have reduced marine invertebrate biodiversity significantly. Effluent and waste discharges from the fish processing industry can require high oxygen for neutralisation, which diminishes oxygen levels in the water. This forces mobile fauna to migrate away and causes the death of sessile and sediment-dwelling organisms. In these oxygen-poor conditions, microbial communities such as anaerobic sulphate-reducing species take over and cause more emissions of sulphide (Delta Marine Consultants, 2010).

The biological and chemical oxygen demand is high in the Harbour area due to organic matter discharged from the fishing industries. Delta Marine Consultants, 2010 report that the average fish factory effluent is 1.7 times higher in chemical oxygen demand (COD) than the influent sea water. Measurements show that fish processing industry contributes about 700 mg COD/l against a maximum discharge limit of 75 mg COD/l permitted in the Water Act of 1956.

The biological oxygen demand (BOD) reduces further away from the Harbour breakwater and the effects of dissolved oxygen concentration in the Lagoon are small. However, during periods of high production, some impact can be expected due to spills from the fishing industry (Danish International Development Agency , 2003).

In the framework of the Local Agenda 21 Project, water quality samples were taken at 9 different stations, of which five stations were in the Bay area, one at the Lagoon entrance and three in the Lagoon. One of the main conclusions of the study is that the environmental conditions of the Lagoon do not appear to be governed by emissions of pollution from the town of Walvis Bay, the fishing industry or the harbour. It is, however, found that the water plume from the harbour vicinity reaches the Lagoon. The impact of the pollution load from man-made sources on the ecological and biological conditions in the Lagoon cannot be distinguished from the impact of the natural high load of nutrients and organic matter (Delta Marine Consultants, 2009).

6.1.2.10 HEAVY METALS AND TRIBUTYLTIN

Heavy metals can become resuspended in the water column, however usually resettle very quickly (approximately five hours). Therefore Section 6.23.7 provides details on heavy metals.

TBT is commonly used in antifouling paints on the hulls of ships to prevent the attachment of molluscs, algae and other organisms. However, as a result of its persistent toxicity to sealife, TBT is being phased out in many countries, including Namibia. There are no approved guidelines for detection limits for TBT in Namibia. The Namport Container Expansion project EIA undertook a comparison of available data from the Bay area with the BCLME Guideline Values drawing extensively on the American Environmental Protection Agency's Ambient aquatic life water quality criteria for TBT. Concentrations of TBT in the water column at twelve different locations in Walvis Bay were higher than the

BCLME guideline values (Municipality of Walvis Bay, 2003). Concentrations have ranged from < 2.5 µg/l to 290 µg/l, with values exceeding guidelines around Berths 1 and 8 and Donkey Bay. TBT below 20 µg/l is considered low; however, analysis of concentrations below the detection limits might still be three times higher than the recommended guideline values. (Delta Marine Consultants, 2010)

6.23.9 Harmful Algal Blooms

Harmful algal blooms (also known as red tides) occur in Walvis Bay as a result of changes in the marine environment, for example through reduced circulation, increased sea temperature and/or changes in nutrients from pollution events. These blooms usually occur in the summer and autumn and can cause low oxygen events which can lead to catastrophic effects on the marine community; in 2008 a *Ceratium fura* bloom result in the largest rock lobster walkout in Namibian recorded history. Appendix J provides further information.

6.23.10 Hydrogen Sulphide Eruptions

Sulphur eruptions are associated with aerobic decomposition of organic material within the sediments, which results in the generation of methane, sulphur dioxide and hydrogen sulphide gasses that become trapped within the layers of organic-rich, anoxic mud. Over time, the pressure exerted by the expansion of these gasses in the sediment, causes the gas to erupt into the water column. These events strip the surrounding water column of dissolved oxygen, resulting in mass mortality of the local marine community. These events are common in Walvis Bay, however as these are natural, recurrent events, the local biota has adapted to the toxicity levels and the associated hypoxic water conditions (Appendix J provides further information).

6.23.11 Marine Habitats and Species

The Benguela Current is one of the most productive ocean areas in the world, however the marine environment carries relatively low biodiversity in all the major marine habitats due to the extremely variable nature of the marine environment at a range of temporal and spatial scales (Appendix J).

The nutrient-rich waters of the Benguela system provide food for phyto- and zooplankton which leads to high biological production and large numbers of pelagic fish such as pilchard, anchovy and juvenile horse mackerel, which in turn sustain an abundance of top predators such as whales, dolphins, shark, turtle and seabirds. The soft-bottom fauna (benthic fauna) is abundant (however species poor (see Section 6.1.2.5) and also provides food for the bird and fish populations.

6.1.2.11 Benthic Fauna

Because of the low oxygen concentration in the sediment (see Section 6.1.2.5), benthic fauna in the Bay area is species-poor. The limited suite of species found are adapted to conditions of low oxygen concentration, and the biomass is dominated by few opportunistic species. The Bay and Lagoon are flushed (6.1.1.6), however this is limited and results in the sediment surface being devoid of other bacterial life below several meters and the biodiversity being reduced to a few species that can tolerate recurrent anoxic conditions (low oxygen concentrations) or can recover fast after oxygen problems. Appendix J provides further information on low oxygen events.

6.1.2.12 Zooplankton

The high production of phytoplankton in the Lagoon is based upon nutrients generated as well as imported into the Lagoon by the tides and currents. Zooplankton finds a plentiful food supply from the phytoplankton, detritus and bacteria in the water and are encouraged by high nutrient levels, warm temperatures and calm water (Walvis Bay Municipality, 2008).

Within the Salt Pans, plankton species include several species of the salt-tolerant unicellular green algae such as Dunaliella species; Rhodobacteria and Halobacteria (which produces the dark reddish colour of the brine water) are

common residents of the evaporation ponds. In addition, a variety of cyano-bacteria (blue-green algae) such as Anabeana, Microcystis; and the brine shrimp (Artemia) are also found. B-carotene originally from Dunaliella and passed on to brine shrimp, who feed on Dunaliella, is responsible for the pink pigment in flamingos (Walvis Bay Municipality, 2008).

The red colour from the Halobacteria is important in the operation of the ponds as more colour in the water increases the heat absorption of sunlight, increasing the temperature of the water and also the evaporation rate. In addition, the red colour from the Halobacteria is found in the blue-green algae on which both the Lesser and Greater Flamingos feed (Walvis Bay Municipality, 2008).

The maintenance of the physical structure of the salt pans currently facilitates the continued existence of benthic and planktonic animals and plants and the birds that feed on them (Walvis Bay Municipality, 2008).

6.1.2.13 ZOOBENTHOS

Zoobenthos are animals that live on, in or near the seabed and are good indicators for the status of marine ecosystems, which can play an important role in both structuring the habitat and as prey for commercially valuable species. A survey conducted in 2012 recorded 18 species from seven phyla of marine benthic invertebrate organisms, which varies considerably from previous surveys; a decrease in the number of species is being encountered. The Polychaeta are the predominant Zoobenthos in the Lagoon and wetland area, which can be associated with their tolerance to high levels of pollution. Crustaceac and Cnidaria are also relatively abundant and present in the samples, with fewer species of Echinoderms, Bivalvia, Spincula and Newmertins. Species richness is greatest in the mouth of the Lagoon, and declines the further into the Lagoon, which could be attributed to the restriction of water reaching that part of the Lagoon. The far south of the Lagoon had no benthic life (University of Namibia, 2012).

6.1.2.14 MAMMALS, FISH & INVERTEBRATES

Marine mammals found in Namibian waters, including the Bay area include cetaceans and seals: a colony of Cape fur seals (Arctocephalus pusillus) is resident on the Peninsula; eight species of baleen whales including Southern Right, Bryde's and Humpback have been seen in Namibian waters; and 23 species of dolphin and toothed whales have been recorded, the most common being the Common, Dusky and Bottlenose Dolphins and the endemic Heavyside's Dolphin (considered as vulnerable due to its limited distribution). Appendix J provides further details on the marine mammals in the Bay area.

Bottle-nosed Dolphins (*Tursiops truncatus*) and whales are observed around the Peninsula and frequently enter the Lagoon. A large proportion of the Bottlenose population uses the shallow waters of the Lagoon for feeding, socializing and resting on a regular basis and this area appears to be a biologically significant area for this population (pers. comm Dr. Simon Elwen NDP 2017). Due to the shallow nature of the Lagoon and the tidal range, dolphins have been known to become stranded in the Lagoon by the outgoing tide. Two stranding events have occurred in recent years: a mature humpback whale on the 14th March 2009 and a mass stranding of 19 bottlenose dolphins in the inner Lagoon on the 16th March 2009 (Simmons RE, 2015) (Elwn, SH and Leeney, EH, 2009).

According to feedback from the Namibian Dolphin Project, the Bottlenose dolphin population inhabiting Walvis Bay numbers is approximately 100 individuals, making it one of the smallest populations of any mammal in southern Africa. This population has been stable (pers comm. Amanda Rau, 15th February 2018), however the population is affected by human activities within its range including marine tourism activities, activities associated with the Namport Container Expansion project, prey depletion and desalination plants amongst others (Appendix J). This pod of dolphins was reported to move north during the two and half years of construction works associated with the phase 1 Namport Container Expansion project (pers com. Amanda Amanda Rau, 15th February 2018).

The Walvis Bay Peninsula is sandy with no vegetation and supports sandy shore animals such as sand hoppers and white mussels, as well as many terrestrial insects. A few marine salt and sand tolerant plant species are scattered on

the inland side of the Peninsula. The harbour wall offers rare surfaces for the attachment of indigenous sessile marine animals such as mussels, barnacles, tube worms, sea squirts and lace-animals. However, pollution from fish factory effluent within the harbour is thought to have reduced marine invertebrate biodiversity significantly (Simmons RE, 2015).

The Lagoon is characterised by two main habitats: extensive shallow, sandy shores that are regularly covered and exposed by tidal action and the sub-tidal deeper (up to 5 m) waters of the southern harbour area. The larger invertebrate fauna in the Lagoon is typical of the Southern African west coast with a high density but low diversity. Distribution of fauna are determined by the varied habitat as well as variations in oxygen levels. Coastal fish species are said to have been caught in great numbers in the Lagoon in the past. Presently large schools of small mullet and springer and some skates and rays are found (Simmons RE, 2015).

Crowned crabs are abundant at the mouth and high densities of bivalves and tubeworms are supported at the mouth and northern reaches of the Lagoon. The middle sub-tidal area supports the greatest species diversity and density of invertebrates in the Lagoon. The southern third of the Lagoon is nearly devoid of bottom-dwelling invertebrates, presumably because of anoxia. The inter-tidal flats support a limited fauna of invertebrates, dominated by small polychaete worms (Simmons RE, 2015).

The evaporation ponds in the Lagoon are used for commercial farming of oysters. Activities associated with the oyster farming has resulted in affecting some marine mammals including whales and bottlenose dolphins.

6.1.2.15 Marine Bird life

As a result of high productivity of the sea life and plankton due to the nutrient-rich Benguela current, wetland areas and available roosting sites, a unique and abundant birdlife is present in Walvis Bay. The bird life is the primary interest of the wetland (and the primary reason for the Ramsar designation – see Section 6.23.12) and provides great conservation value, locally and internationally, as well as economic value from tourism. Walvis Bay holds the largest number of birds than any other wetland in southern Africa, which is predominantly dominated by wading birds. The number of wading birds are highest in the austral summer when all the migrant waders congregate at the coastal wetlands. The winter numbers reflect, mainly, the resident species with a few over-wintering sub adult migrants that do not need to head back to the northern hemisphere (Appendix H).

There are four main waterbird habitats within the Walvis Bay wetland complex: the sandy shoreline (including the Peninsula), intertidal mudflats, shallow sheltered water, and constructed saltpans. The most important feature of the area is the mudflats which are exposed at low tide, providing several sandbars serving as roosting sites for a diverse range of wetland birds, including migrant waders and resident species.

The Peninsular provides a suitable ground for numerous terns to roost, and various seabirds colonise the area; the bird count in summer months average out at approximately 150,000 individuals. In the Lagoon wading birds, rather than seabirds, predominate (40% of the waders in the area), and approximately 20 bird species regularly occur in numbers greater than 1% of the world's population.

The salt pans support up to half various species of bird, where they feed in the shallow pans that have a steady artificial influx of particles and nutrient-rich water that fuels the benthic and pelagic food-chain. The pans are also good habitat for rarer waterbirds such as the Rednecked Phalarope (*Phalaropus lobatus*), Common Redshark (*Tringa totanus*), Eurasian Curlew (*Numenius arquata*) and Bairds Sandpiper (*Calidris bairdii*) (Walvis Bay Municipality, 2008).

The broad groups of birds found in the Bay area are Terns, Gulls, Cormorants, Pelicans, Sandpipers, Plovers, Grebes, Flamingos and other species. The most numerous species are lesser and greater flamingos, with sometimes more than 40,000 individuals. Eleven endangered species have been observed in the area (IUCN Red List) and 9 of the 25 species are Namibian threatened Red Data species (see Appendix H); one of these species, the Chestnut-banded

Plover present almost half of the world's population. The Bay supports a range of migratory birds which breed elsewhere (northern hemisphere and Africa), however when rains fail, Intra-African migrants will breed at Walvis Bay. Resident wetland birds e.g. pelicans and Damara Terns are present all year and breed along the Namib coast (Appendix H).

The open desert landscape and the presence of predators, mainly Black-backed Jackals and Kelp Gulls (*Larus dominicanus*), combine to limit opportunities for ground-nesting birds to breed at Walvis Bay. The wetland therefore serves mainly as a dry-season and drought refuge for intra-African migrants and as a non-breeding area for Palearctic migrants (Appendix H).

Thirty years of twice-yearly bird counts have been undertaken. A summary of the trends found are as follows:

- Significant population declines have occurred since the early 1990s in four of the 12 long-distance migrants investigated (Turnstone, Ringed Plover, Red Knot, Little Stint);
- In contrast, resident or short-distance migrant wader populations all exhibited stable or increasing population levels relative to the early 1990s;
- Population levels increased for White-fronted Plover (Charadrius marginatus), Chestnut-banded Plover, Black-winged Stilt (Himantopus himantopus), Pied Avocet (Recurvirostra avosetta), and Greater Flamingo (Phoenicopterus ruber) relative to the early 1990s;
- The most abundant waders in these wetlands, Curlew Sandpiper and Sanderling (Calidris alba), had stable populations, although both populations may have had slightly higher levels from 2005 to 2006. Both species showed a marked drop in winter counts, especially in 2009 and 2010.

Overall migrant birds have been declining in abundance, while resident and intra-African migrant are stable, or increasing, at Walvis Bay over 30 years. Overall, despite the declines exhibited by some long-distance (Palearctic) migrants, and the stability or increases in resident species, no differences between Walvis Bay and Sandwich Harbour were found (Simmons et al, 2015). This suggests that Walvis Bay showed no adverse effects of the harbour facilities of the time or the potential dangers of pollution from bilge water, or oils. However, this is not true of the Lagoon (see below).

The Lagoon is estimated to hold around 40% of the total number of waders found in the wetland (Ramsar site), therefore is very important to the avian community in Walvis Bay. The counts taken since the mid-1990s illustrate various changes to the bird community. The two key findings identified are:

i) The Chestnut-banded Plover and Lesser Flamingo increased in numbers. These species prefer saline saltpans, which may suggest conditions are becoming more saline; and

ii) For the majority of comparisons, the species in the Lagoon showed declining numbers; and overall abundance dropped by 42% in the 20 years since the mid-1990s. Given that long term trends (Simmons et al. 2015) show only four of the 12 long-distance migrants and none of the resident species have declined overall in the Walvis Bay wetland in the last 30 years, these declines in the Lagoon cannot be explained by broad-scale declines.

The conclusion drawn from the Avian Study (Appendix H) is that changes to the Lagoon environment itself are the cause of these avian declines. The changes to the Lagoon can be associated with both natural and anthropogenic influences, namely the long-term impact from the flow of the Kuiseb River being diverted; and the construction activities of the Namport Container Expansion project. The decrease in the average number of wetland birds using the Lagoon was recorded immediately after the Namport Container Expansion project: the average numbers dropped from 21,078 to 17,406, a decline of 17% in four years (two years before the project and 2 years after). The long-term decline in wader numbers of approximately 42% over a 20-year period, gives an average rate of decline of approximately 2.1% per year. This does not prove that the Namport Container Expansion project caused the decline

of birds using the Lagoon, but the fact that it is associated temporally with it, and doubled the rate of decline over a short period, strongly suggests the two are linked.

The reduction in bird numbers can be attributed to sedimentation, salination, pollution and/or disturbance. An increase in sediment (see Section 6.23.6) may decrease feeding opportunities, decreasing the likelihood that wading birds will use the area.

6.1.2.16 IMPORTANT BIRD AREA

In addition to the Ramsar site which is also an Important Bird Area (IBA) (Birdlife International, 2018), the 30km section of coastline from Walvis Bay to Swakopmund is designated as an IBA, an internationally recognised area by Birdlife International (Birdlife International, 2018) (see Figure 31). This area has up to 770 birds per kilometre of shore line, which is the highest linear count of birds anywhere in Southern Africa. The importance of this coastline for birds is largely due to the high productivity especially on the rocky shores and the sheltering effect of the Pelican Point Peninsula (Walvis Bay Municipality, 2008).

Approximately 9km north of Walvis Bay is an artificial guano platform a for nesting birds from which the guano is harvested annually (Walvis Bay Municipality, 2008).

6.23.12 WALVIS BAY RAMSAR SITE

The Walvis Bay Ramsar Site was designated on 19th June 1995, as the wetland was considered of international importance due to its ornithological significance (detailed above). The site is considered as one of the most important coastal wetlands in Southern Africa for its birdlife, which supports up to 250,000 individual birds at peak times during the summer season.

The wetland site consists of the natural areas of Walvis Bay Lagoon, Pelican Point (southern half) and the adjacent intertidal areas. It also includes the Walvis Bay Salt Works, including the artificially flooded evaporation ponds, and the area to the south which occasionally floods (Ramsar, 2017) (see Figure 56). The only terrestrial vegetation in the wetland is the extensive riverine vegetation in the Kuiseb Delta and in the Kuiseb ephemeral river.

The site is approximately 4,000ha (40km^2) and the most important characteristic of the site is the mudflats exposed at low tide which provides a feeding area for various bird species, the qualifying feature. The Walvis Bay Ramsar site and Sandwich Harbour Ramsar site located approximately 55km south of Walvis Bay, are Namibia's most important coastal wetlands which support eight endangered species and individually support more waterbirds than any other coastal wetland area in Southern Africa (Delta Marine Consultants, 2010). Appendix H and J provide more info on the Ramsar Site and environmental interfaces.

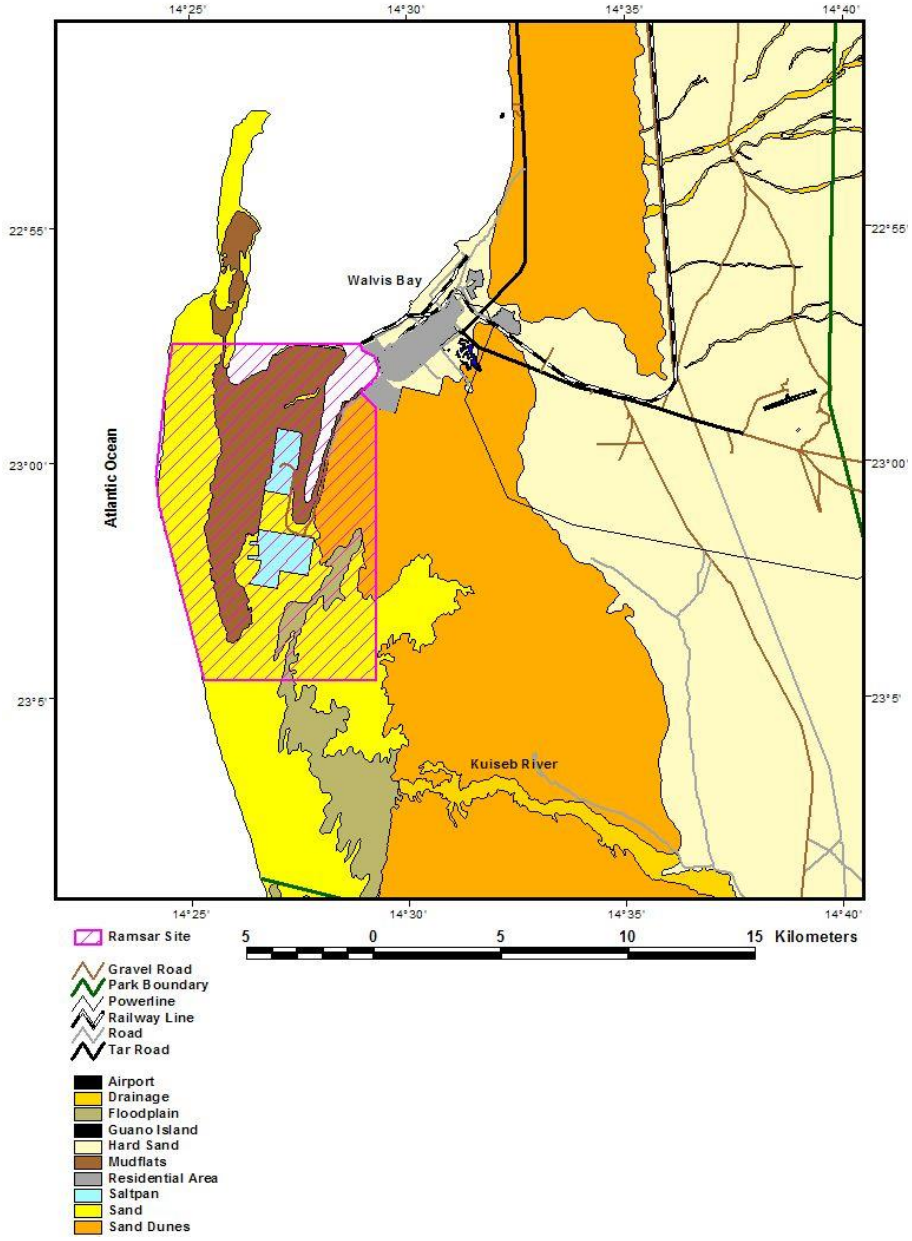


Figure 56 - Walvis Bay Ramsar Site [Source: (Ramsar, 2017)]

Various environmental interactions and processes contribute to the diverse and dynamic site. The bird life is supported and made up of distinct attributes including the mudflats exposed at low tide, the numerous sandbars, water quality and hydrodynamics, and marine ecology. Changes to the environmental characteristics of Bay area and in particular the Lagoon such as sedimentation, recharge and flow rate, and chemical composition could impact the environmental conditions thereby impacts the attributes of the site. This, in turn, can indirectly affect the bird populations, and thus jeopardise the loss of the international designation and potentially impacting the local tourism industry and other ecological services.

Current threats to the Ramsar Site includes the development along the edge of the Lagoon, which could affect bird populations; natural siltation; natural geomorphological changes to the coastline; the fishing industry; tourism activities; pollution; and development within the marine environment, namely the Namport Container Expansion project.

6.24 Future Baseline

As described in previous sections, the development of the Bay area and receiving environment have seen various changes over the years as a result of both anthropogenic influences, and natural processes and systems. These changes will continue to change, thereby the baseline of the social and environmental baseline described in the earlier sections is likely to change within the timeframe and lifetime of the proposed project.

This Section provides a high-level description of the predicted and potential future changes of sensitive environmental and social features and attributes (the Future Baseline). The described future baseline is focussed on the area surrounding the proposed project site and the direct receiving environment. The existing baseline, trends identified through studies, assumptions and professional judgment have been used to develop this high-level summary.

The purpose of this summary is to provide an understanding that the environmental and social baseline will continue changing in the absence of the proposed project. This summary is a prediction and is focussed, and does not provide an assessment of these changes. As part of an ESIA, it is important to understand the future baseline and apply this to the assessment to identify likely future significant impacts, particularly in the CIA (International Finance Corporation, 2013).

6.24.1 Town Development

As a result of economic growth in Namibia driving development, the town of Walvis Bay will continue to develop as set out in the IUSDF (Municipality Walvis Bay, 2014) and summarised in Section 6.11.1. The major infrastructure projects in the area are the development of the South Port (the Namport Container Expansion project) and the North Port. As a result of the increased capacity and subsequent increase in operations, there will be significant downstream developments and knock-on effects. There will be a requirement for local services, amenities and facilities, and housing for example, which will all contributing to the town's growth as well as altering the environmental and social baseline, for example an increase in vehicles on the road and other modes of transport is very likely, thereby altering the noise levels and potential local air quality.

In addition to industrial growth, tourist arrivals are set to increase from 1.4 million to 1.8 million by 2021/22 and increase employment from 29,000 to 43,000, as per the 5th NDP. This will result in various direct and indirect changes to the environment and society in Walvis Bay and the Lagoon area, including but not limited to an increase in local businesses and other service providers (restaurants, hotels, downstream providers); an increase in tourism activity providers and associated operations; an increase in recreational activities (e.g. fishing, boating and tours); an increase in noise levels; a potential reduction in unemployment; and further development and infrastructure to support the growth.

Committed development in the area surrounding of the proposed project site are the second and third phases of the Namport Container Expansion project (see Section 6.11.2 for further information). There is potential for other development in the local area, for example the Namport waterfront development; the development Lovers Hill facilities (both of these identified in the IUSDF); and the development of the adjacent property on the north-western corner of erven 4941 (Namib Times, 12th January 2018). With an increase in tourism, activities in the surrounding marine environment are also likely to increase, as well as traffic on the local roads and number of visitors to the Lagoon area.

6.24.2 The Lagoon Environment

The Lagoon is a valuable environmental and social receptor: it forms a fundamental component of the Ramsar site; it draws tourists to the area for the bird life; is used recreationally by visitors and local residents; supports several businesses namely the Salt Works and maricultural; supports an important avian community; and provides an area for marine mammals to feed and rest.

The Lagoon environment is a complex system composed of various attributes that come together to form a unique ecosystem. The key attributes and influences are: the flow and tidal flushings (currents and tides) into and out of the

Lagoon and around the Bay area; sedimentation; water quality (BOD, COD, salinity and temperature); nutrient levels and supporting phyto- and zooplankton. The key attributes that are likely to continue to change are discussed in the following sections.

6.24.3 The Lagoon: Water Flow & Refreshment Rate

The hydrodynamic modelling undertaken for the Namport Container Extension project modelled flow and current conditions as well as refreshment rates for the existing baseline and future baseline, which includes the completion of all three phases of the Namport Container Terminal. The model demonstrated that there would be a change to the current patterns, in particular in the southern part of the Bay as well as the currents in and out of the Lagoon. The Lagoon refreshment rates could be reduced by 10 – 15% under certain conditions, in addition to the port basin refreshment rates, and the infrastructure will reduce water exchange between the port basin and the Lagoon (the natural clockwise circulation) (Delta Marine Consultants, 2009).

The completion date of all three phases of the Namport Container Extension project is unknown at this stage, however it can be assumed they will not commence until 2025; at least four years after the proposed project is completed. The changes to the currents and refreshment rates will therefore not occur until the proposed project is operational.

It should be noted at this stage, that the hydrodynamic modelling undertaken for the proposed project (Appendix I) only modelled the first phase of Namport's Container Extension project, which was almost complete at the time of modelling. Phases 2 and 3 were not modelled as the presence of the marina would not impact the hydrodynamics of the Bay and Lagoon (Pers Comm Hendrick Bergmann, DMC, 13th December 2017).

The change to the currents and reduction in the refreshment rate would result in indirect changes to other attributes that make up the Lagoon's ecosystem.

6.24.4 The Lagoon: Water Quality

Due to the potential changes to the hydrodynamics of the Bay area and thus the Lagoon, the water quality in the Lagoon is also likely to change. The temperature and salinity could increase across the Lagoon due to reduced flushing; pollution may increase due to increased activities in the marine environment and may not effectively be flushed out of the Lagoon; and harmful algal blooms and hydrogen sulphide eruptions may worsen due to reduced circulation and increase in temperature.

6.24.5 Sedimentation and the Lagoon

6.24.5.1 Continual Sedimentation

As discussed in Section 6.23.6, various natural and anthropogenic influences contribute to sedimentation in the Lagoon. With regards to natural processes, it is assumed sediment will continue to be transported into the Lagoon at the current rates from the surrounding dunes by south-westerly winds and from the Bay through the natural flushing and hydrological processes, as well as through continued biological activity. Based on the Lagoon profiles measured over the last 14 years and considering likely survey inaccuracies, it has been calculated that the Lagoon is accreting at a rate in the order of 5,000m^3/yr (Danish International Development Agency , 2003). In addition, it is also assumed that historical changes continue to have an influence (Salt Works and changes to the Kuiseb river) as well as current operations (Namport maintenance dredging) further exacerbating the sedimentation of the Lagoon.

6.24.5.2 Construction of Namport's Container Expansion

As discussed in Section 6.11.2, the second and third phases of Namport's Container Expansion project is still to be undertaken. Namport's Hydrological Study (Delta Marine Consultants, 2009) estimated that the dredged material during phase 1 to be 4,265,256m^3, 8,208,657m^3 for phase 2 and 3,508,768m^3 for phase 3. The dredging works in phase 1 took approximately two and a half years, therefore it can be assumed that dredging works during phases 2 and 3 could take eight years. These dredging activities are very likely to contribute to increasing sedimentation in the

Bay area and the Lagoon, which would cause changes to the Lagoon's environment thereby having knock on impacts to dependent receptors, namely birds.

The construction of the first phase of the Namport Container Expansion project has been observed to increase suspended solids and result in sedimentation in the Bay and Lagoon. As stated in the Limitations Section (3.2.1), turbidity monitoring data (organic matter and sediment) was requested from Namport the period between 2014 and 2016, however was not made available for inclusion in the ESIA and this ESIA report; it is currently unknown if Namport undertook data collection throughout the duration of the construction works of phase 1. It is therefore assumed based on visual observations and modelling outputs from the Namport Hydrodynamic Report, that sedimentation increased during this time, entered and settled in the Lagoon. The extent is unknown, however indirect impacts on the avian life across the Lagoon have been recorded (see Section 6.1.2.15).

In the absence of data, the Namport hydrological study is relied upon (Delta Marine Consultants, 2009). The study modelled dredging plume simulations for phase 1 construction works (phases 2 and 3 were not modelled). During construction, the sediment plume would spread in front of the entrance of the Lagoon (the mouth), from where the sediment plume enters the Lagoon during the subsequent flood tide. It was predicted that the concentration of suspended sediment in the Lagoon would locally rise to 0.5-1.0kg/m^3. This is higher than the commonly accepted value of 0.15kg/m^3, however the report concludes that the Lagoon would only be exposed to these high sediment loads for a very short duration, shorter than 1 week during the initial construction activities (the duration of these activities was not provided). The Lagoon would continue to be exposed to sediments throughout the construction phase, however would reduce progressively through the phase and would be below 0.15kg/m^3 for the remainder of the construction works.

The settlement of these sediments was also modelled. After three days, most of the sediment would settle in the deeper part in front of the Lagoon entrance (the mouth), and a small amount would settle in the Lagoon (mainly along on the banks). The total sediment load on the Lagoon was calculated to be in the order of 200 ton.

Whilst the modelling outputs present an indication of the sedimentation in the Lagoon as a result of constructing phase 1, the actual conditions and changes to the Lagoon have not been recorded and additional modelling undertaken with these results. It can therefore only be assumed that similar sedimentation will occur for phases 2 and 3, which may be worse for phase 2 due to the amount of material to be dredged; 8,208,657m^3, twice the amount for phase 1. However, the slight reduction in the currents in the Bay from phase 1, which will reduce further as phases 2 and 3 are constructed, may influence the spread of sedimentation into the Lagoon.

6.24.5.3 OPERATIONS OF NAMPORT'S CONTAINER EXPANSION

The hydrodynamic modelling undertaken as part of the EIA for the Namport Container Extension project also modelled and analysed sediment transportation in the marine environment once all three phases are completed. The study concluded that the port development will have an influence on the sedimentation and erosion rates in the Lagoon, resulting in the bathymetry of the Lagoon altering. Accretion and erosion for both the Lagoon and tidal flats were identified; the average rates increased slightly from the baseline with the most noticeable difference occurring on the tidal flats (Delta Marine Consultants, 2009):

- **Lagoon:** The size of accretion and erosion areas, and the average accretion and erosion rates are almost unchanged (reduced by less than 5%).
- **Tidal flat:** The erosion area is slightly enlarged, the accretion area is reduced in size (by about 15%). The average accretion rates are somewhat reduced (by about 30%), the erosion rates are also slightly reduced (by about 10%.

The following morphological changes in the Lagoon were identified through the modelling and are predicted to occur once all three phases are completed:

- The bed level will be slightly lowered along the western banks of the Lagoon;

- Smaller patches with local erosion or sedimentation are expected in the northern part of the Lagoon; and
- Some sedimentation is expected at the eastern banks of the entrance to the Lagoon.

6.24.5.4 FUTURE SEDIMENTATION IN THE LAGOON

Taking into consideration the sources of sedimentation outlined above, it is likely that the Lagoon will continue to be exposed to increased suspended solids and sedimentation through both anthropogenic and natural processes, which may be further exacerbated through a reduced flow rate due to the structure of the completed Namport Container terminal. Collectively, this would result in further changes to the Lagoon's environment and ecology, and thereby affect dependent features (e.g. birds).

It is highly likely that human activities are speeding up the siltation of the Lagoon.

6.24.6 BATHYMETRY, GEOMORPHOLOGY AND COASTAL DYNAMICS

As documented in Section 6.23.5, the coastal area around Walvis Bay is a highly dynamic coast that constantly changes due to natural processes such as wave action, currents and sediment supply (see Figure 51 and Figure 52). In the Bay area and Lagoon, the eastern channel in the mouth of the Lagoon slightly shifted to the east in 2012 and 2013; and the Lagoon sandspit has grown over the years but has slowed down between 2007 and 2013 and seems to be stabilising. Natural changes are expected to continue; however, these changes are unknown due to the influence of anthropogenic activities.

The development of Namport Container Expansion project (all three phases), may contribute to the changes of the coastline. There is potential for the new development to accelerate coastal erosion and accretion due to the changes in the circulation of the Bay and the refreshment rates of the Lagoon (see Section 6.24.3). The depth of the Lagoon and the characteristics of the seafloor are likely to change as a result of this.

6.24.7 MARINE MAMMALS

The most sensitive marine mammals (receptor) in the local environment are the Cetacea. As discussed in Section 6.1.2.15 various species are found in the Walvis Bay area including eight species of baleen whales and 23 species of dolphin. Despite the increase in commercial activity within Namibia's Economic Exclusion Zone, visual observations suggest that whale and dolphin populations have been increasing in the last decade. The population of Bottlenose dolphin has been stable as well as the Heaviside's population (pers comm. Amanda Rau, 15th February 2018). During phase 1 of Namport's Container Extension project, the Bottlenose Dolphin moved away from the Bay and Lagoon area to Langstrand (Long Beach). The reasons for this move for example was it their food relocated, or they moved due to disturbance is unknown. It can be assumed however, that through the construction of phases 2 and 3, the Dolphins will relocate again.

Due to the hydrological changes in the Bay area and the Lagoon (see above), there is potential for anoxic conditions to spread from the southern area of the Lagoon towards the centre. This could increase the area that is devoid of bottom-dwelling invertebrates, which could potentially cause secondary impacts to the supporting ecosystem, e.g. reduce fish stock and bird life.

In addition to the construction of the Namport Container Extension project, other activities will increase in the area: the operations of extended port shall increase, thereby increasing number of vessels in the Bay area; tourism is expected to increase thereby increasing the number of recreational activities in the marine environment; and fishing is likely to increase (to name a few). These can all directly and indirectly alter the marine environment that Cetacea use. There is therefore potential for Cetacea to move away from the area and use areas with fewer anthropogenic influences, e.g. Sandwich Harbour.

6.24.8 Bird Life & Ramsar Site

The Lagoon which forms a fundamental component of the Ramsar site is estimated to hold around 40% of the total number of waders found in the wetland (Ramsar site), therefore the Lagoon environment is very important to the avian community in Walvis Bay and Southern Africa. Any changes to the Lagoon's dynamics or supporting attributes could affect the avian wildlife (as discussed in Section 6.24.2).

As part of the Avian Impact study (Appendix H), the impacts on bird numbers in the Lagoon as a result of phase 1 of the Namport Container Extension project were investigated. A decrease in the average number of wetland birds (using 35 years of data) using the Lagoon was recorded immediately after the Container Expansion project and an increase in bird numbers was recorded in bird counts taken in early 2018. The study concluded that an increase in sedimentation in the Lagoon has occurred since the construction of phase 1 which could be one of the leading factors that have negatively affected the local flora and fauna of the Lagoon.

It is expected that the diversity of the bird population and numbers of individuals will change in the future due to the historical and current anthropogenic and natural systems and direct and indirect changes to the Lagoon environment. It has however, been documented that certain activities have exacerbated the situation, namely phase 1 of the Namport Container Extension project. It is therefore expected that phases 2 and 3 are likely to affect the Lagoon's environment (discussed in the preceding sections) to a similar degree due to the predicted extended construction schedule (see Section 6.11.2).

Taking into consideration the potential future changes to the Lagoon environment, the qualifying features of the Ramsar site may be affected. The changes to the bird populations will also alter the number and type of tourists of visit the area, which may indirectly alter tourism service providers and the local economy.

7 PREDICTION AND EVALUATION OF IMPACTS METHODOLOGY

7.1 INTRODUCTION

Chapter 3 provides an overview of the ESIA process detail each of the steps undertaken to date, the current one, and future ones. Prediction and evaluation of impacts, Step 4, is the key step in the ESIA process. This chapter outlines the method followed to predict and evaluate the impacts arising from the proposed project. The findings of the assessment are presented in Chapter 8.

This chapter provides the following:

- Details on the assessment guidance used to develop the methodology;
- Lists the limitations, uncertainties and assumptions with regards to the assessment methodology;
- Details how impacts were predicted and evaluated, and how the level of significance was derived;
- Details how mitigation was applied in the assessment and how additional mitigation was identified; and
- Details the CIA method.

7.2 ASSESSMENT GUIDANCE

The principal documents used to inform the assessment method are:

- International Finance Corporation standards and models, in particular Performance Standard 1, 'Assessment and management of environmental and social risks and impacts' (International Finance Corporation, 2017) (International Finance Corporation, 2012);
- International Finance Corporation Cumulative Impact Assessment (CIA) and Management Good Practice Handbook (International Finance Corporation, 2013)
- Namibian Draft Procedures and Guidance for EIA and EMP (Republic of Namibia, 2008);
- International and national best practice;

7.3 LIMITATIONS, UNCERTAINTIES AND ASSUMPTIONS

The following limitations and uncertainties associated with the assessment methodology were observed:

- Topic specific assessment guidance has not been developed in Namibia. A generic assessment methodology was applied to all topics using IFC guidance and professional judgement;
- Guidance for CIA has not been developed in Namibia, and a single accepted state of global practice has been established. The IFC's guidance document (International Finance Corporation, 2013) has been used for the CIA; and
- Due to professional judgement being applied, it has been difficult to indicate the degree of confidence for the assessment findings.

7.4 DETERMINATION OF SIGNIFICANCE

The evaluation and prediction of environmental and social impacts require the assessment of the project characteristics against the baseline of environmental and social characteristics, and ensuring all potentially significant impacts are identified and assessed.

The significance of an impact was determined by taking into consideration the combination of the sensitivity and importance/value of environmental and social receptors that may be affected by the proposed project, the nature and characteristics of the impact, and the magnitude of potential change. The magnitude of change (the impact) is the identifiable changes to the existing environment which may be direct or indirect; temporary/short term, long-term or

permanent; and either beneficial or adverse. These are described as follows and thresholds provided in Table 19 to Table 20.

- The **sensitivity and value of a receptor** is determined by identifying how sensitive and vulnerable a receptor is to change, and the importance of the receptor (internationally, nationally, regionally and locally).
- The **nature and characteristics of the impact** is determined through consideration of the frequency, duration, reversibility and probability and the impact occurring.
- The **magnitude of change** measures the scale or extent of the change from the baseline condition, irrespective of the value. The magnitude of change may alter over time, therefore temporal variation is considered (short- term, medium-term; long-term, reversible, reversible or permanent)

Table 18 - Sensitivity and Value of Receptor

SENSITIVITY AND VALUE	DESCRIPTION
High	Of value, importance or rarity on an international and national scale, and with very limited potential for substitution; and/or very sensitive to change, or has little capacity to accommodate a change.
Medium	Of value, importance or rarity on a regional scale, and with limited potential for substitution; and/or moderate sensitivity to change, or moderate capacity to accommodate a change.
Low	Of value, importance or rarity on a local scale; and/or not particularly sensitive to change, or has considerable capacity to accommodate a change.

Table 19 - Nature of Impact

NATURE	DESCRIPTION
Positive	An impact that is considered to represent an improvement on the baseline or introduces a positive change.
Negative	An impact that is considered to represent an adverse change from the baseline, or introduces a new undesirable factor.
Direct	Impacts causing an impact through direct interaction between a planned project activity and the receiving environment/receptors.
Indirect	Impacts that result from other activities that are encouraged to happen as a result / consequence of the Project. Associated with the project and may occur at a later time or wider area
Extent / Geographic Scale	
On-site	Impacts that are limited to the boundaries of the proposed project site
Local	Impacts that occur in the local area of influence, including around the proposed site and within the wider community
Regional	Impacts that affect a receptor that is regionally important by virtue of scale, designation, quality or rarity.
National	Impacts that affect a receptor that is nationally important by virtue of scale, designation, quality or rarity.
International	Impacts that affect a receptor that is internationally important by virtue of scale, designation, quality or rarity.
Duration	
Short-term	Impacts that are likely to last for the duration of the activity causing the impact and are recoverable
Medium-term	Impacts that are likely to continue after the activity causing the impact and are recoverable

Long-term	Impacts that are likely to last far beyond the end of the activity causing the damage but are recoverable over time
Reversibility	
Permanent /Irreversible	Impacts which are not reversible and are permanent
Temporary / Reversible	Impacts are reversible and recoverable in the future
Likelihood	
Certain	The impact is likely to occur
Likely	The impact is likely to occur under most circumstances
Unlikely	The impact is unlikely to occur

Table 20 - Magnitude of Change

MAGNITUDE OF CHANGE	DESCRIPTION
Major	Loss of resource, and quality and integrity of resource; severe damage to key characteristics, features or elements; or Large scale or major improvement of resources quality; extensive restoration or enhancement; major improvement of attribute quality.
Moderate	Loss of resource, but not adversely affecting its integrity; partial loss of/damage to key characteristics, features or elements; or A benefit to, or addition of, key characteristics, features or elements; improvements of attribute quality.
Minor	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (or maybe more) key characteristic, feature or element; or A minor benefit to, or addition of, one (or maybe more) key characteristic, feature or element; some beneficial effect on attribute quality or a reduced risk of a negative effect occurring.
Negligible	Very minor loss or detrimental alteration to one (or maybe more) characteristic, feature or element; or Very minor benefit to, or positive addition of, one (or maybe more) characteristic, feature or element.

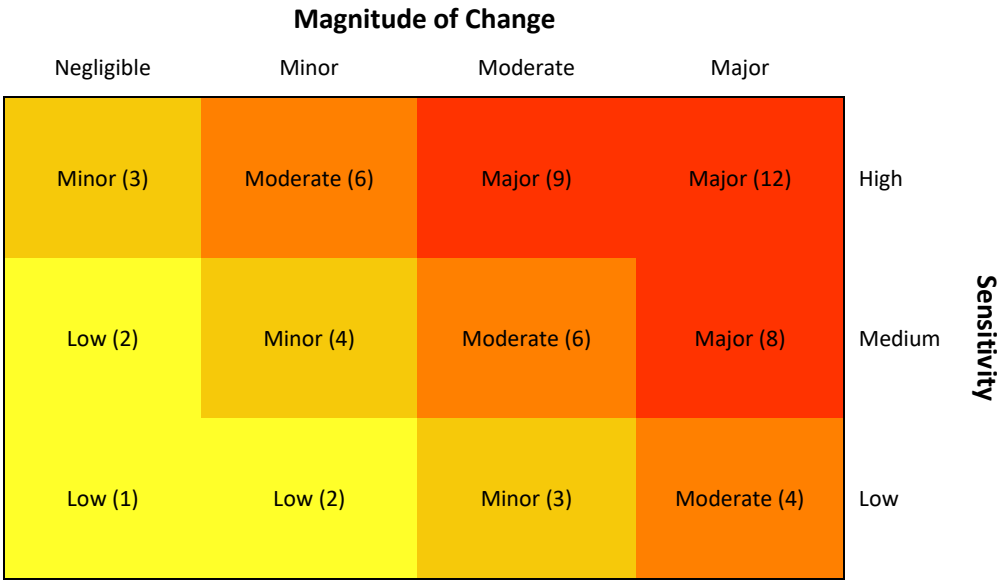
The level of certainty has also been applied to the assessment to demonstrate how certain the assessment conclusions are and where there is potential for misinterpretation or a requirement to identify further mitigation measures, thereby adopting a precautionary approach. Where there is a low degree of certainty, monitoring and management measures can be implemented to determine if the impacts are worse than predicted and support the identification of additional mitigation measures through the lifetime of the proposed project.

Table 21 – Level of certainty

LEVEL OF CERTAINTY	DESCRIPTION
High	Likely changes are well understood. Design/information/data used to determine impacts is very comprehensive. Interactions are well understood and documented. Predictions are modelled, and maps based on interpretations are supported by a large volume of data. Design/information/data has very comprehensive spatial coverage or resolution.
Medium	Likely changes are understood. Design/information/data used to determine impacts include a moderate level of detail. Interactions are understood with some documented evidence. Predictions are modelled but not yet validated and/or calibrated. Mapped outputs are supported by a moderate spatial coverage or resolution.
Low	Interactions are currently poorly understood and not documented. Predictions are not modelled, and the assessment is based on expert interpretation using little or no quantitative data. The design is not fully developed, or information has poor spatial coverage or resolution.

The significance of impacts has been derived using professional judgment and applying the identified thresholds for receptor sensitivity and magnitude of change (as discussed above), and guided by the matrix presented in Figure 57. The matrix is applicable for impacts that are either positive or negative. The distinction and description of significance and whether the impact is positive or negative is provided in Table 22.

Figure 57 – Guide to significance ratings



Significance is not defined in the Namibian EIA Regulations, however the Draft Procedure and Guidance for EIA and EMP states that the significance of a predicted impact depends upon its context and intensity. Accordingly, definitions for each level of significance has been provided in Table 22. These definitions were used to check the conclusions of the assessment of receptor sensitivity, nature of impact and magnitude of impact was appropriate.

Table 22 – Significance Description

SIGNIFICANCE OF IMPACT	DESCRIPTION
Major (negative)	Impacts are considered to be key factors in the decision-making process that may have an impact of major significance, or large magnitude impacts occur to highly valued/sensitive resource/receptors. Impacts are expected to be permanent and non- reversible on a national scale and/or have international significance or result in a legislative non- compliance. Factors key to the decision-making.
Moderate (negative)	Impacts are considered within acceptable limits and standards. Impacts are long term, but reversible and/or have regional significance. These are generally (but not exclusively) associated with sites and features of national importance and resources/features that are unique and which, if lost, cannot be replaced or relocated. Factors likely to be key to the decision-making.
Minor (negative)	Impacts are considered to be important factors but are unlikely to be key to the decision-making. The impact will be experienced, but the impact magnitude is sufficiently small (with and without mitigation) and well within accepted standards, and/or the receptor is of low sensitivity/value. Impacts are considered to be short term, reversible and/or localized in extent.
Low (negative)	Impacts are considered to be local factors that are unlikely to be critical to decision-making.
Low – Major (Beneficial)	Impacts are considered to be beneficial to the environment and society:

To ensure the beneficial impacts are brought out in the assessment, green has been applied to ensure the different type of impact is clear. The description for each level of significance presented in Table 22 was also followed when determining the level of significance of a beneficial impact.

The significance of impacts has been derived using professional judgment and applying the identified thresholds for receptor sensitivity and magnitude of change, as well as the definition of significance. It most instances, moderate and major adverse impacts are considered as significant, and however there may be some instances where impacts are lower than this, but are considered to be significant. The following thresholds were therefore used to double check the assessment of significance had been applied appropriately; a significant impact would meet at least one of the following criteria:

- It exceeds widely recognized levels of acceptable change;
- It threatens or enhances the viability or integrity of a receptor or receptor group of concern; and
- It is likely to be material to the ultimate decision about whether or not the environmental clearance certificate is granted.

7.5 Environmental Mitigation

Mitigation comprises a hierarchy of measures ranging from preventative environmental impacts by avoidance, to measures that provide opportunities for environmental enhancement. The mitigation hierarchy is: avoidance;

reduction at source; reduction at receptor level; repairing and correcting; compensation; remediation; and enhancement.

Mitigation measures can be split into three distinct categories, broadly defined as:

1. Actions undertaken by the ESIA process that influence the design process, through implementing design measures that would entirely avoid or eliminate an impact, or modifying the design through the inclusion of environmental features to reduce the magnitude of change. These are considered as embedded mitigation.
2. Standard construction practices and other best practice measures for avoiding and minimizing environmental impacts. These are considered as good practice measures.
3. Specified additional measures or follow-up action to be implemented to further reduce adverse impacts that remain after the incorporation of embedded mitigation. These are considered as additional mitigation.

The ESIA is an iterative process whereby the outcomes of the environmental assessments inform the design. Considerable mitigation has been built into the design of the proposed project as potentially significant adverse environmental impacts have been identified and design changes have been identified to overcome or reduce them. The ESMP (Appendix A) provides the good practice measures and specified additional measures or follow-up action.

Embedded mitigation and good practice mitigation have been taken into account in the assessment. Additional mitigation measures have been identified when the significance of impact requires it and causes the impact to be further reduced. Where additional mitigation has been identified, a final assessment of the significance of impacts (residual impacts) was carried out taking into consideration the additional mitigation.

7.5.1. CUMULATIVE IMPACTS

The EIA Regulations clearly states that cumulative impacts should be considered as part of the EIA for a proposed project. Good practice requires that, as a minimum, cumulative impacts are assessed during the ESIA process.

Cumulative impacts can arise when a single resource or receptor is affected by more than one impacts from the proposed project. For example, a local resident could be affected by noise from construction vehicles and dust from ground excavation during the construction stage. In isolation, the impacts of noise and dust may be insignificant, however when combined, the impacts on the local resident may result in a significant impact. **This is termed 'Intra-Project Cumulative Impacts'.**

Cumulative impacts may also arise as a result of the combination of two or more projects. A receptor could be impacted by similar types of impact from different developments or a receptor could be impacted by different types of impact from different developments. This could occur at the same time or at different times. **This is termed Inter-Project Cumulative Impacts**. An example of this is as follows; noise generated during the construction stage of the proposed project may not cause a significant effect in isolation; however, a sensitive receptor (e.g. local resident) may be significantly impacted when noise from the proposed project is combined with noise generated from other projects. These projects could be future projects or existing projects which may have ongoing influences on the environment in the future and are expected to interact with the same environmental and social receptors as the proposed project (International Finance Corporation, 2013).

In addition to considering other projects, it is important to consider natural stressors such as droughts and natural dynamic systems and potential future changes within the lifetime of the proposed project.

Cumulative impacts have a wide temporal and spatial scope, and are not restricted to a local area nor need to happen at the same time. It is therefore, crucial to identify a suitable study and assessment area, as well as a timeframe to assess. Cumulative impacts can also be vast and complicated; therefore it is important to focus on the significant impacts.

7.5.2. CUMULATIVE IMPACT ASSESSMENT METHOD

The IFC, the private sector arm of the World Bank Group, is committed to ensuring that the costs of economic development do not fall disproportionately on those who are poor or vulnerable. This commitment is implemented through the January 1, 2012, IFC Policy on Environmental and Social Sustainability and its corresponding, comprehensive set of eight Performance Standards that define IFC clients' responsibilities for managing their environmental and social impacts and risks (International Finance Corporation, 2012). Performance Standard 1, *Assessment and Management of Environmental and Social Risks and Impacts* recognizes that because of the increasing significance of system wide risk factors such as climate change, water availability, decline of species biodiversity, degradation of ecosystem services, and modification of socioeconomic and population dynamics, among others, cumulative impact assessment and management (CIA) is an essential framework for risk management.

Performance Standard 1 defines the project area of influence to encompass *"cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned, or reasonably defined developments at the time the risks and impact identification process is conducted."* Performance Standard 1 offers some context to limit the cumulative impacts to be addressed to *"those impacts generally recognized as important on the basis of scientific concerns and/or concerns from Affected Communities"*.

The CIA has been undertaken by applying the IFC Good Practice Handbook for CIA and Management (International Finance Corporation, 2013). Through a review of this guidance, a rapid CIA has been applied due to certain limitations. A rapid CIA takes into consideration the challenges associated with a good CIA process, which includes lack of basic baseline data, uncertainty associated with anticipated development, limited government capacity, and absence of strategic regional, sectoral or integrated resource planning schemes.

The six-step rapid CIA process has been followed:

- Step 1: Scoping - determine spatial and temporal boundaries
- Step 2: Scoping - identify valued environmental and social receptors and identify reasonably foreseeable developments
- Step 3: Determine present condition of valued environmental and social receptors (the baseline)
- Step 4: Assessment of cumulative impacts and evaluation of the significance of the cumulative impacts
- Step 5: Identification of mitigation measures to avoid or reduce cumulative impacts

The following information has been applied to the assessment in line with the above steps and IFC Guidance:

- The spatial and temporal boundaries of the CIA are the extent of Walvis Bay town boundaries and the duration of the construction and operation phases of the proposed project (up to 40 years into the future);
- Valued environmental and social receptors that may be affected are those presented in Chapter 6. No additional ones have been identified through this CIA;
- A review of existing and reasonable anticipated and/or planned developments has been undertaken which is based on the information presented in Sections 6.9, 6.10 and 6.11.
- The predicted future conditions of sensitive and common environmental and social receptors (section 6.24) have been taken into consideration in the assessment;
- The assessment findings presented in Chapter 8 have been applied to the CIA in combination with professional judgment and published environmental assessment reports; and
- A review of mitigation and monitoring measures have been undertaken, with any additional ones identified.

8 ASSESSMENT FINDINGS AND MITIGATION

8.1 INTRODUCTION

This chapter presents the findings of the ESIA for the proposed project as per the ESIA process, scope and methodology set out in Chapter 3 and Chapter 7. A range of potential impacts have been identified that may arise as a result of the proposed project. The aim of this ESIA report is to focus on the significant impacts that may arise as a result of the proposed project. This chapter therefore only considers the significant impacts and those that have specific interest to the community and stakeholders. A summary of impacts that are not considered significant is discussed in section 8.3.

Impacts that are considered significant or are those of interest to the community and stakeholders are as follows:

- Socio-economic: Tourism
- Socio-economic: Employment
- Socio-economic: Local Businesses
- Socio-economic: House Prices
- Socio-economic: Community Severance
- Socio-economic: Community Bulk Services
- Socio-economic: Community Facilities
- Socio-economic: Noise Impacts
- Socio-economic: Air Quality Impacts
- Socio-economic: Sense of Place
- The Marine Environment: Water Flow
- The Marine Environment: Water Quality
- The Marine Environment: Birds
- The Marine Environment: Mammals
- Relocation of Sporting Facilities
- Cumulative Impacts

For each potential significant or sensitive impact, a summary is provided which includes the activity that would cause an impact; the potential impacts; embedded or best practice mitigation (stated where required / available); the sensitivity of receptor that would be impacted; the severity, duration and probability of impacts; the significance of impacts before mitigation and after mitigation measures are applied.

8.2 LIMITATIONS, UNCERTAINTIES AND ASSUMPTIONS

The following assumptions and uncertainties identified during the assessment process include:

- The environmental and social baseline presented in Chapter 3 has been used in the assessment. It is recognized that the project design had evolved since certain specialist studies were conducted. Some conclusions and recommendations of these studies may no longer be applicable, and therefore have not been included in the ESIA report or where required. Where required, consultation with specialists was undertaken to revise the conclusions and recommendation; these have been captured in this chapter where relevant;
- The project description in Chapter 4 has been applied to the assessment. Any changes to the design, construction methods etc. may alter the assessment findings. If this occurs, the assessment will need to be revisited and further assessment work may be required;
- Lack of noise monitoring data and assessment modeling, a realistic worst-case scenario has been applied and a qualitative assessment has been undertaken; and

- The Walvis Bay IUSDF anticipates and plans for population and development growth in the town, and therefore identified required public services (schools, hospitals, shops, residential areas). It is assumed these services are adequate and suitable for the workers and families of the proposed project. An assessment of pressure and demand for services has therefore not been included in the socio-economic assessment.
- Namibia does not have a centralized database that logs all planned or realistically defined projects that are applying for Environmental Clearance are logged and this available for people /consultants to refer to in order to determine or obtain all potential projects in a given area, the assessment of potential combined impacts is limited to known projects through a detailed literature review.
- The EIA report prepared for the Namport Container Expansion project has been used to undertake the CIA for reasonable defined projects. This has several limitations which are brought out in the assessment.
- A rapid CIA has been undertaken due to the uncertainty associated with the anticipated development and lack of or limited quantitative information.

8.3 Impacts not Considered as Significant

As a result of an iterative design development process, mitigation has been incorporated and embedded into the design, thereby designing out environmental and social impacts or reducing the potential impact so that it is not significant. Best practice has also played a role in avoiding or reducing potential impacts. The ESMP provides best practice measures, management and monitoring for all impacts.

Impacts that have been assessed as not being significant are summarised in Table 23 and not discussed further.

Table 23 – Summary of impacts not assessed as being significant

ENVIRONMENT / SOCIAL TOPIC	POTENTIAL IMPACT	SUMMARY OF ASSESSMENT FINDINGS
Cultural heritage	There is potential to uncover heritage remains during construction activities.	Findings are unlikely. By applying good construction practice measures and following measures detailed in the ESMP in the event of finding remains, the potential impact is not considered significant.
Air Quality	The operations of the proposed project may discharge air pollution.	During operations, minimal activities will discharge aerial emissions and pollutants (carbon dioxide, sulphur dioxide and particulate matter) to the atmosphere that would alter the baseline conditions. Best practice measures for Marina operations will be implemented as detailed in the ESMP. Dust have been included in the assessment due to the risk during construction.
Climate change – adaptation	The potential for climate change impacts to impact the proposed project, for example, sea level rise and storm surges	The proposed project will not be significantly impacted by the impacts of climate change as the design has considered storm surges, sea level rises and localised flooding. The design has been adapted considering these issues, such as height about sea level and buildings set back from the coastline. Embedded design measures are discussed in the project description.

Climate change – cause / contribute to	The proposed project contributing to climate change through the discharge of greenhouse gas emissions	The proposed project is considered as a relatively small development and will be constructed within approximately 3.5 years. The operations of the proposed project will not emit greenhouse gases apart from carbon dioxide indirectly through the generation of electricity. The proposed project will implement energy efficiency technologies where possible and will be built considering energy efficiency, for example double glazing. Best practice measures such as avoiding the idling of vehicles are included in the ESMP.
Groundwater	Potential to impact the groundwater through pollution or abstraction during construction and operation. Potential to alter the hydrodynamics of the flow of the groundwater.	Best practice construction methods will be applied and are detailed in the ESMP. These will avoid pollution of the groundwater. The Inner Marina has an impermeable base, and will be constructed with inert materials and cement. It is unlikely that the hydrodynamics of the groundwater is likely to be significantly affected as a result of the proposed project, due to its size and nature of groundwater.

8.4 Socio-economic Environment: Economic

The term socio-economic impact assessment embraces both social impacts and economic impacts. Economic impacts include issues such as employment, changes in economic activity such as tourism, and increased expenditure. The significant economic impacts or impacts that have specific interest to the community and stakeholders are summarised in Figure 58 and discussed in more detail in this section.

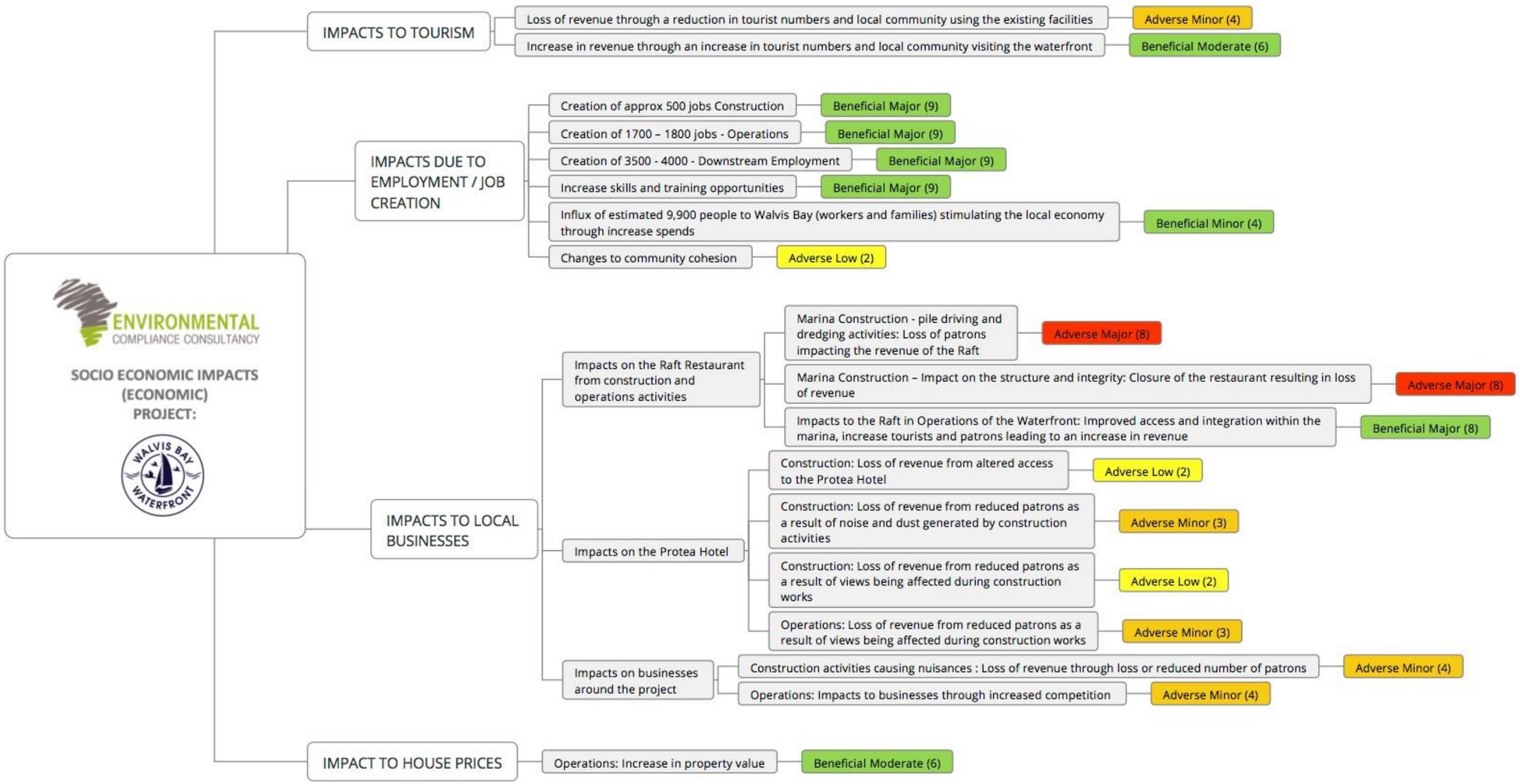


Figure 58 – Economic Impacts

8.4.1. TOURISM

Tourism is an important industry in Walvis Bay and supports the local economy. Tourists visit the area for the birdlife, marine life and adventure activities such as quad biking in the dunes. Various tourism related receptors are in close proximity to the proposed project site, including The Raft Restaurant, the Yacht Club, the Protea Hotel, shops, restaurants and tourism operators along the existing marina, as well as the Lagoon and Bay which supports an important ecosystem for tourism and recreational related activities. The impacts on tourism as a result of the proposed project is detailed in this section.

The loss or increase of tourist numbers may have an impact on the revenue of local businesses that support the industry. This section provides an overarching assessment of impacts arising from fluctuations in tourist numbers. Specific impacts to individual business receptors are included in section 8.4.4.

8.4.2. TOURISM INDUSTRY: CONSTRUCTION

During the construction stage, there will be an increase in traffic on the local roads around the proposed project site resulting in potentially increased journey times and increased noise, and noise and dust will be generated from the movement and operation of construction vehicles. Tourists frequenting the facilities on existing waterfront may choose not to use these facilities due to this disruption; may stay for shorter periods of time; or may not visit the facilities again. Spending would reduce, potentially affecting local vendors and other tourism activity providers, and other downstream receptors which rely on the tourism industry.

These construction activities may have a direct impact on the tourism industry, however it is considered that the nature of the impact is short term and reversible. The tourism market in Walvis Bay is of low sensitivity in this instance: tourists will not be deterred from visiting Walvis Bay, but potentially from the existing waterfront and other facilities in the area. Alternatives and substitutions are available in the town; therefore; the magnitude of change is considered minor as the change of the baseline is expected to be small. Measures such as a site boundary fence, traffic management and calming measures (banksmen and signposts for any diversions) and specific scheduling of specific activities to minimise noise impacts on local receptors would be implemented. Construction vehicles, in particular, heavy vehicles, will avoid travelling on roads at peak times, for example school runs, evenings and weekends. Taking into consideration these mitigation measures, the significance of impact on the tourism industry is considered to be minor.

It is also acknowledged that tourists come to the area for the marine and bird life. There is potential for construction activities to cause indirect impacts to the flora and fauna of the marine environment (see Sections 8.7 and 8.8 for the findings of this impact). For example, an increase in suspended sediments and reduction in water quality could result in marina mammals not frequenting the area, and an increase in noise could disturb bird life, causing them not to roost along the local shoreline. This is considered as a cumulative impact and therefore discussed in Section 8.9.1.

8.1.1.1 TOURISM INDUSTRY: OPERATIONS

The proposed project will provide waterfront facilities in which people live, work and play; and will create a community and tourism asset that will drive economic development in Walvis Bay and the Erongo Region. The proposed project will attract and retain visitors in Walvis Bay, which will result in local spends thereby supporting the local and wider economy. Local accommodation, restaurants, shops and retail and tourist/recreational activities will all benefit, and revenue will increase.

The direct and indirect impacts of visitor spending benefit the community and economy long term. This impact is considered irreversible, as the proposed project will become a tourist node and permanent feature of the urban landscape. The overall significance of the impacts on the tourism economy is therefore considered to have a moderately beneficial impact.

There is concern that the marine environment which is one of the main tourist attractions could be affected by the proposed project through increased sedimentation and noisy activities. Impacts on the marine environment have been assessed and presented in Sections 8.6, 8.7 and 8.8.

8.1.1.2 SUMMARY OF IMPACTS ON THE TOURISM INDUSTRY

Table 24 – Impact assessment for revenue and tourism

Activity	Receptor/s	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Construction activities - general	– Local tourism industry – The Raft – Protea Hotel – Businesses around the sites	Loss of revenue through a reduction in tourist numbers and local community using the existing facilities	Adverse Direct Local Short Term Irreversible	Medium	Minor	Adverse Minor (4)
Operations	– Local tourism industry – Users of the Development – The Raft – Protea Hotel – Businesses around the sites	Increase in revenue through an increase in tourist numbers and local community visiting the waterfront	Beneficial Direct Regional Long Term Irreversible	Medium	Moderate	Beneficial Moderate (6)

8.4.3. EMPLOYMENT

Whilst Namibia has a high unemployment rate, the Erongo Region is one of the highest employment rates in Namibia. In Walvis Bay, the majority of employment is through Harbour operations, the fishing industry and the processing of sea salt. The value and sensitivity of employment is considered to be high as it is of importance to the country.

8.1.1.3 DIRECT EMPLOYMENT: CONSTRUCTION

Approximately 500 jobs will be generated during the construction phase. The proponent will employ Namibians wherever possible and feasible to fulfil the roles. Construction works will take approximately three and a half years to complete, therefore the beneficial impact of creating 500 temporary jobs will result in a medium-term impact with a moderate magnitude of change. A moderate beneficial impact on the community and economy is therefore expected.

8.1.1.4 DIRECT EMPLOYMENT: OPERATION

Approximately 1700 - 1800 jobs will be created in the operational stage as a direct result of the project, with an anticipated additional 3500 - 4000 jobs generated as downstream opportunities. As above, the proponent will employ Namibians wherever possible and feasible. The magnitude of change during operation is considered as moderate, but having long term impacts thereby resulting in a major beneficial impact on the community and economy.

8.1.1.5 INDIRECT EMPLOYMENT IMPACTS

Various indirect impacts will arise as a result of job creation, including an increase in skills, increase in population, increase in economic activity and changes to community cohesion.

With increase job creation, indirect benefits will be brought to the area: worker skills will improve, and training opportunities will arise, thereby bringing long-term benefits to the area and local communities. A large proportion of the Namibian population is unskilled working in the agricultural industry. Through skills improvements and training,

workers, who are highly sensitive to potential improvements will see long-term benefits, thereby resulting in a major beneficial impact.

Coupled with job creation is the potential migration of workers and their families to the town of Walvis Bay. The average Namibian household size is 4.4 according to the 2011 Namibia Population and Housing Census (Namibia Statistics Agency, 2011). The creation of approximately 5,000 jobs during operations could potentially result in the migration of an estimated 9,900 people to Walvis Bay (worst case scenario), assuming 65% of workers are already living in Walvis Bay. This influx of people to the town will put pressure on the existing services, such as water, waste, sewerage and community facilities and services, such as schools and hospitals.

The Walvis Bay Municipality has catered for the town's expansions and expected population growth, which is detailed in the Walvis Bay IUSDF (Walvis Bay Municipality, 2014). Areas where workers would relocate to are the expanding and developing land in the Kuisebmond and Narraville areas. The Walvis Bay IUSDF identifies community services and facilities required to support population increase, such as hospitals, schools and police services (see Section 6.11.1). Some of these improvements have been undertaken and others continue to be supplied. The demand for these services and extra pressure on existing ones has therefore not be considered in the assessment as it is assumed that have been appropriately catered for through the provisions set out in the IUSDF.

The impacts arising from the influx of workers and their families to Walvis Bay is considered beneficial as it stimulates the economy as an indirect impact. The sensitivity of the economy is considered to be medium as economic development is an important regional issue. The magnitude of change will be minor as local spends from the families of workers will attribute to the economy, but is unlikely to result in medium scale improvements.

Another potential impact as a result of the influx of workers and their families is the potential impacts on community cohesion. The demographics of the workers that will fill the unskilled roles during the construction and operations of the proposed project, is diverse. The community where workers would live are accustomed to change and the inflow and outflow of migratory workers, which is attributed to the seasonal and variable fishing industry in Walvis Bay. Diverse communities in Walvis Bay are used to change and therefore are not considered as sensitive, however there is potential that there may be a reduction in community safety and cohesion as a result of the influx of workers to the area.

The magnitude of change is anticipated to be negligible, therefore the impacts on community cohesion such as culture impacts, increase in crime or community disputes are unlikely to result in an adverse significant impact.

8.1.1.6 SUMMARY OF EMPLOYMENT IMPACTS

Table 25 – Impacts on employment and influx of people to Walvis Bay.

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Construction works - general	− Community − Job seekers − Local economy	Creation of 500 jobs	Beneficial Direct Regional Short Term Reversible	High	Moderate	Beneficial Major (9)
Operations of the proposed project	− Community − Job seekers − Local economy	Creation of 1700 – 1800 jobs	Beneficial Direct Regional Long Term Reversible	High	Moderate	Beneficial Major (9)
Downstream job creation	− Community − Job seekers − Local economy	Creation of 3,500 – 4,000	Beneficial Indirect Local	High	Moderate	Beneficial Major (9)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
			Long Term Reversible			
Job creation	– Community	Increase skills and training opportunities	Beneficial Indirect Local Long Term Reversible	High	Moderate	Beneficial Major (9)
Influx of workers & families	– Community – Local economy	Influx of estimated 9,900 people to Walvis Bay (workers and families) stimulating the local economy through increase spends	Beneficial Direct Local Long Term Reversible	Medium	Minor	Beneficial Minor (4)
Influx of workers & families	– Community	Changes to community cohesion	Adverse Direct Local Long Term Reversible	Low	Negligible	Adverse Low (1)

8.4.4. Local Businesses

The Raft Restaurant and Protea Hotel are immediately adjacent to the proposed project site boundary, and other businesses such as the Yacht Club, Anchors Restaurant, the Boardwalk, Lyon Des Sables Restaurant, Brume sur le port, The Venue and View Café occupy the existing waterfront. Impacts on these businesses have been assessed, and the findings are presented in this section.

8.1.1.7 The Raft Restaurant: Construction

The Raft Restaurant is positioned in the Lagoon approximately 40m from the shoreline. The Restaurant will become part of the Marina and be accessed via the marina wall. Patrons visit the restaurant for meals at lunchtime and dinner. Key features of the restaurant are the sea views and the marine environment surrounding the building which is visited by dolphins and other marine life.

During construction, activities in the marine environment have the potential to impact The Raft Restaurant through a reduction in patrons leading to a loss of revenue. The Raft Restaurant is privately owned and is considered as being of medium sensitivity with moderate capacity to accommodate change. The construction of the breakwater wall will take approximately one month to construct, and vibratory pilling will be required for construction. This noisy activity will take approximately two weeks. Once the breakwater wall has been constructed, the marina access channel will be dredged, which will require substantial pipework to pump the sediment into the marina area for transport onshore. These noisy and visually intrusive activities, as well as the overall view of the construction landscape, will deter patrons from visiting the restaurant, but also affect their visit thereby reducing their stay (and spends) and discourage from visiting again.

A visual screen will be erected to reduce views into the construction working area. A partial loss of from The Raft will be experienced, however the seaward views will not be affected. The vibratory piling techniques employed during construction were identified as they are the least noisy. Access will be provided at all times either via the existing boardwalk or via the new marina wall once constructed. Taking into consideration these design measures, the magnitude of change on the Raft is considered to be moderate due to the potential loss of patrons during this short term, temporary construction activity. The significance of impact is therefore considered to be of major adverse.

8.1.1.8 The Raft Restaurant: Structure and Integrity

The Raft Restaurant is built on wooden piles in the marine environment. The integrity of the structure has not been fully determined and further investigation will be undertaken prior to construction activities commences. Through visual observations, some of the piles require maintenance and repair. Due to the current condition, there is a risk that the structures and foundations could be impacted by construction works, in particular activities that emit vibrations such as piling and other construction works in close proximity to The Raft.

Qualified vibratory pile driving operators will be engaged to undertake the piling activities and an assessment on the best approach to prevent harm or damage to the structure will be completed prior to and during construction activities. A pre-construction survey will be conducted and recorded, including a photographic report. This will be signed off by both the proponent and the owners of the Raft. If necessary, a pre-construction agreement will be drawn up with the owners of the Raft Restaurant. Downtime would be minimised as far as possible.

In the event that measures are required to protect the structure prior to construction or construction activities impact the integrity of the structure, the business may be temporarily closing down due to safety requirements, and would not reopen until works have been undertaken to protect or repair the damage. The Raft is considered as a medium sensitivity receptor as it has a moderate capacity to accommodate change. If closed down for a short-term temporary period, the magnitude of change would be major due to the loss of revenue to the business owner. A major adverse impact would therefore occur. The certainty of this impact is low due to the lack of a detailed structure investigation.

8.1.1.9 The Raft Restaurant: Operation

The final design of the marina integrates The Raft into the design. The Raft will be accessed along the marina wall and will remain as a predominant position and feature in the overall waterfront. The access route will be slightly longer than the existing route, however the safety, security and lighting of the new access route would be an improvement from the current arrangements. The walkway will be used by patrons, but also tourists who want to view the Marina. In addition, parking bays provided as part of the proposed project will be an improvement of the current parking arrangements.

The proposed project will create community and tourism facilities, which will attract and retain tourists in Walvis Bay. As a result, an increase in potential patrons will frequent the Raft Restaurant thereby resulting in increased revenue. The Raft Restaurant is a medium sensitivity receptor. With this long-term positive improvement, the magnitude of change is considered to be major, thereby the significance of impact has been assessed as major beneficial.

Considering the potential short-term temporary impacts during construction and the long-term positive benefits during operation, the overall impact on the Raft Restaurant is considered to be beneficial.

8.1.1.10 Summary of Impacts on the Raft Restaurant

Table 26 – Impacts on the Raft

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Marina Construction - pile driving and dredging activities	– The Raft	Loss of patrons impacting the revenue of the Raft	Adverse Indirect Local Short Term Temporary and Reversible	Medium	Major	Adverse Major (8)
Marina Construction – Impact on	– The Raft	Closing of the restaurant resulting in loss of revenue	Adverse Indirect Local	Medium	Major	Adverse Major (8)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
the structure and integrity			Short Term Temporary and Reversible			
Operations	– The Raft	Improved access and integration within the marina, increase tourists and patrons leading to an increase in revenue	Beneficial Indirect Local Long Term Irreversible	Medium	Major	Beneficial Major (8)

ADDITIONAL MITIGATION

Whilst the impact during construction has been assessed to be of major significance, the nature of the impact will be of short duration and the long-term beneficial impacts would most likely outweigh the adverse impacts. Additional mitigation measures to reduce this impact further have not been identified, however, the proponent is currently in discussions with the business owners of The Raft where further measures may be identified to manage the impacts identified.

8.1.1.11 PROTEA HOTEL: ACCESS

The Protea hotel is located opposite the proposed project site on the north-east corner and is accessed via Atlantic Street and The Esplanade. During construction, the Esplanade will be stopped up and will not be available to access the hotel. This will a permanent change to the road network, however as the main vehicle access route to the hotel is considered as via Atlantic Street (as per signposts), the sensitivity of hotel access and users is considered to be low as there is an alternative option which will remain open throughout construction. The magnitude of change is minor; even though the road will be permanently lost and thus the baseline changed, regular users accessing the hotel will adapt quickly. There also may be a reduction in passing traffic, thereby bringing benefits to the hotel through less traffic and associated noise emissions. The significance of the potential impact is therefore considered as low.

8.1.1.12 PROTEA HOTEL: CONSTRUCTION

The hotel is designed to allow rooms to have views of the Lagoon. Several rooms face the south overlooking into the Lagoon and the Raft Restaurant. The views of some rooms will therefore overlook the off-shore construction area. The dining room also has views over the Lagoon and from this angle, it will be possible to see the construction site. This can be mitigated through the layout of the dining room and restrict views out of the windows through the arrangement of the dining room and temporary screening measures. The main views that would be affected would be from the bedrooms, which would have limited screening options, however the view of the construction area would occupy a small proportion of the view into the Lagoon.

The hotel is directly opposite the proposed project site and it is anticipated that construction activities will impact the patrons of the hotel. Earth movements and general construction activities will cause dust to arise and potentially be blown off site. Noise will be generated from the operation of construction plant and equipment, and an increase in construction traffic will be felt in the vicinity of the site. These nuisances could reduce the number of patrons frequenting the hotel or nights spent in the hotel, thereby reducing spends and overall revenue for the hotel.

The findings of the noise assessment is documented in section 8.5.4, which includes impacts on patrons and staff of the hotel. The findings of the dust assessment 8.1.1.33. This economic assessment focuses on the indirect impacts resulting from a potential loss of trade and revenue.

Construction works will not be undertaken at night and noisy activities will be restricted to certain times of the day. The access route into the proposed project site will be off Atlantic Street and not opposite the Protea Hotel, construction traffic will therefore not pass the hotel. The block-out fence surrounding the construction site will help contain dust, dust suppression techniques will be applied where required and a suitable drainage system during construction will be installed to minimise any surface run-off entering neighbouring properties. Best practice construction measures will also be implemented.

The Protea Hotel is part of the Marriott International Group, and therefore is considered as a being of low value and low sensitivity as it will be able to accommodate change. The impacts associated with the views into the Lagoon are considered to have a minor magnitude of change as some of the characteristics of the view would alter for a short duration and would be temporary in nature. It is considered that the change in view would not deter patrons from using the hotel, therefore the significance of this impact is assessed to be low adverse.

The impacts associated with construction noise and dust has been assessed as having a moderate magnitude of change, which is concluded after applying the mitigation measures, including scheduling of noisy activities outside of sensitive times (early morning, evenings and weekends) and no night time working. The hotel and all other local receptors would be provided with an early warning for any noisy construction works. The magnitude of change has been derived as it is envisaged that some patrons may complain and may not frequent the hotel during the construction period, and therefore some revenue will be lost as a result. The overall significance of the impact is minor.

8.1.1.13 PROTEA HOTEL: OPERATION

The proposed project will have two new hotels offering a total of 211 rooms and other facilities, which will result in direct competition for the Protea Hotel. As per the National Policy on Tourism (Directorate of Tourism, 2008), competitive tourism business that enhances the country's ability to compete internationally is needed in the country. The increased competition and the other facilities of the proposed project will generate improved services and choice for the consumer in a free market. The hotel is considered as a low sensitive receptor and the change to the baseline of businesses in the area is considered to be moderate as there is potential for the integrity of the Protea Hotel to be affected. However, the proposed development will encourage tourist visiting and staying at the waterfront, therefore the potential impact of increased competition may be lessened due to the potential increase in users. Therefore, the potential environmental impact has been assessed at as being moderately adverse.

8.1.1.14 SUMMARY OF IMPACTS ON THE PROTEA HOTEL

Table 27 – Impacts on the Protea Hotel

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Construction – general activities	– Protea Hotel	Loss of revenue from altered access to the Protea Hotel	Adverse Indirect Local Short Term Irreversible	Low	Minor	Adverse Low (2)
Construction – general activities	– Protea Hotel	Loss of revenue from reduced patrons as a result of noise and dust generated by construction activities	Adverse Indirect Local Short Term Irreversible	Low	Moderate	Adverse Minor (3)
Marina construction – general activities	– Protea Hotel	Loss of revenue from reduced patrons as a result of views being affected during construction works	Adverse Indirect Local Short Term	Low	Minor	Adverse Low (2)

			Temporary Reversible			
Operations	– Protea Hotel	Increased competition, leading to reduced revenue	Adverse Indirect Local Short Term Temporary Reversible	Low	Moderate	Adverse Minor (3)

8.1.1.15 OTHER BUSINESSES

Other businesses surrounding the proposed project site may be affected during the construction and operational phases of the project. The Raft and the Protea Hotel which are directly opposite the site have been discussed previously. Other businesses that may be affected have been grouped together as it is likely that they will have similar impacts.

CONSTRUCTION

During construction, increased traffic and other construction nuisances (dust and noise) will arise. Access to the existing Waterfront will maintain, although it will be disrupted due to the Esplanade closing and due to construction traffic using the main route (Atlantic Street) potentially causing disruption to journey times. The construction of the Namport Container Extension project has been undertaken for the last few years, and some construction traffic has been routed along the existing waterfront, therefore the area is used to these higher and fluctuating levels. However, the potential remains for some local diners and tourists being discouraged from visiting the existing waterfront due to an increase in traffic and associated noise levels, and ease of access to these facilitates (journey times and stress levels). Patrons may use alternative restaurants and venues away from the construction site and surrounding area. Revenue may therefore be lost through a loss of patrons or less time (and thus spends) spent dining and drinking. The local restaurants are locally owned and therefore are considered as medium sensitive receptors. Any disruption would be of a medium duration during the construction phase but would be limited to specific times, e.g. construction works between 7am and 6pm. Access would remain at all times and any impacts are likely to be temporary, therefore the magnitude of change would be minor, resulting in an impact of minor adverse.

Local hotels and B&Bs in the area are considered to be medium sensitive receptors as they are also locally owned companies and could be sensitive to change. These receptors may also be affected during construction; however, construction traffic and activities will be limited to certain times and areas, therefore the normal operations of accommodation providers are unlikely to be affected and customers are unlikely to be deterred from using the facilities, thereby representing a minor magnitude of change and a minor adverse impact.

OPERATIONS

As a result of the proposed project, various restaurants, shops and two hotels will be introduced to the area, thereby generating competition. The philosophy being the proposed project is to create the peoples Waterfront that supports local businesses (see Section 1.4). The concept is to prevent a carbon copy large retail chain environment and have a mix of local and international brands. The increased competition may place pressure on the existing businesses, which may experience disruption and a loss of patrons and customers. However, taking into consideration the potential increase in tourists visiting the area, the diversity of potential businesses, and the probability that impacts will be experienced in the first six months due to locals trying the new venues and then moving back, the nature of impact may be both positive and negative, resulting in a minor magnitude of change. Accordingly, the impacts on local businesses and revenue is expected to be adverse minor.

8.1.1.16 SUMMARY OF IMPACTS ON OTHER BUSINESSES

Table 28 - Impacts to businesses around the development

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Construction activities causing nuisances	– Businesses around the sites	Loss of revenue through loss or reduced number of patrons	Adverse Indirect Local Short Term Reversible	Medium	Minor	Adverse Minor (4)
Operations	– Businesses around the sites	Impacts to businesses through increased competition	Adverse Indirect Local Long term Reversible	Medium	Minor	Adverse Minor (4)

8.4.5. HOUSE PRICES

The proposed project will alter the local area and integrate new facilities such as a marina, two new hotels, restaurants, shops and other amenities. Through public consultation, concerns have been raised regarding how the proposed project could impact the value of properties surrounding the proposed project site.

The possible impacts on property values surrounding the development can be related to several international case studies (Oliva, 2006). Case studies have shown that house prices can be affected by waterfront developments in a beneficial way. Evidence supports that property values increase in close proximity to a Waterfront development, decreasing the further you move away from the waterfront (see Figure 59). The overall impact associated with property values is considered to have a beneficial direct long-term impact on private property owners, who are considered to be a medium sensitive receptor as the finance associated with houses have limited potential for substitution.

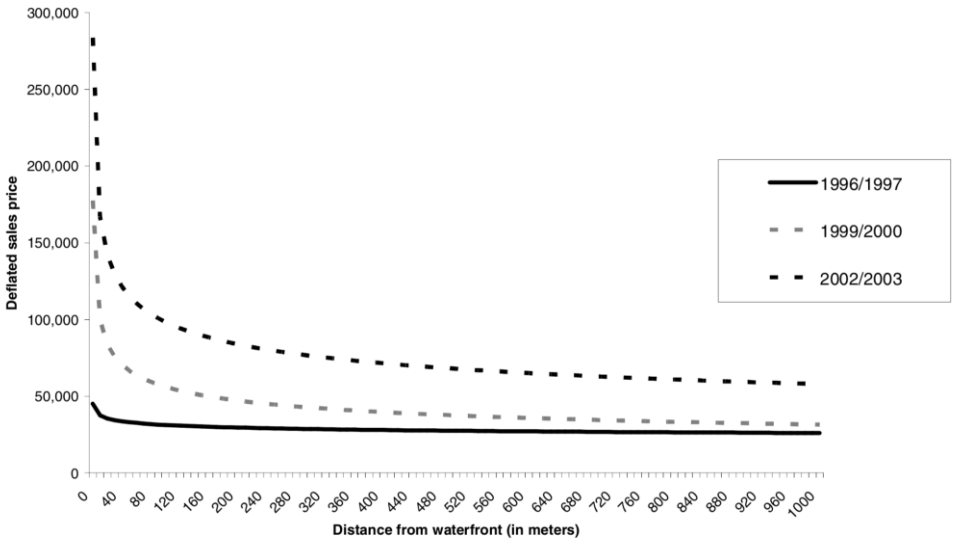


Figure 59 – House prices surrounding the waterfront (Oliva, 2006)

8.1.1.17 SUMMARY OF IMPACTS ON HOUSE PRICES

Table 29 - Impacts to housing prices

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Operations	– Private property owner	Increase in property value	Beneficial Indirect Local Permanent Irreversible	Medium	Moderate	Beneficial Moderate (6)

8.5 SOCIO-ECONOMIC ENVIRONMENT: SOCIAL

Social impacts include the consequences to local populations in terms of ways in which people live, work and interact. The significant social impacts or impacts that have specific interest to the community and stakeholders are summarised in Figure 60 and discussed in more detail in this section.

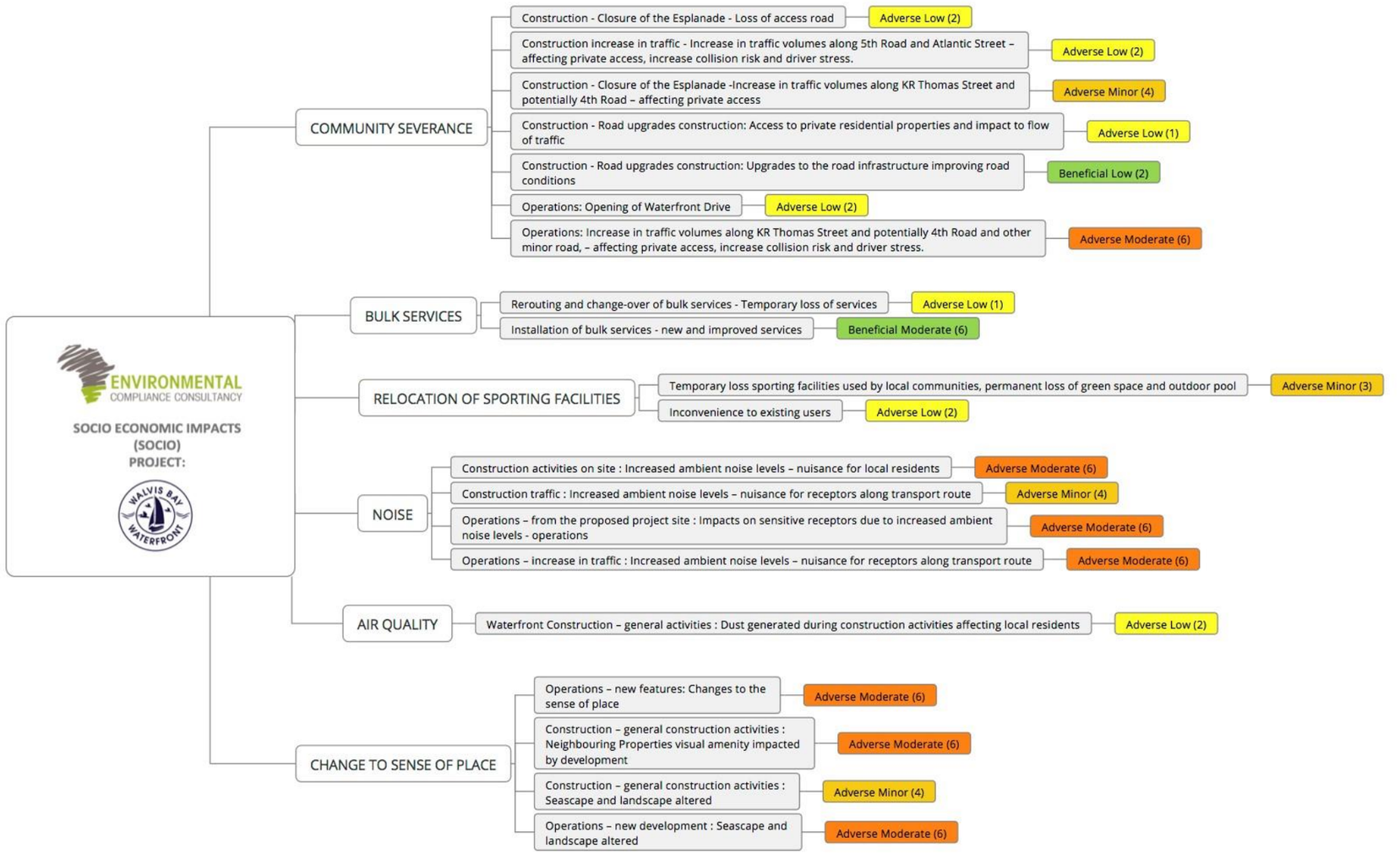


Figure 60 – Social Impacts

8.5.1. COMMUNITY SEVERANCE

During construction, there will be an increase in construction traffic and The Esplanade will be closed, diverting traffic along KR Thomas Street up to 5th Road or along Waterfront Drive once completed. There is potential for local residents and the community to suffer from severance as a result of disrupted access in and out of private residential properties, increased traffic movements leading to increased journey times and access to the town's facilities, and changes to normal traffic flows (increasing traffic on streets where it would not usually flow).

8.1.1.18 COMMUNITY SEVERANCE DURING CONSTRUCTION

An increase in traffic (construction vehicles delivering workers, plant and material, and removing waste and marine material) will be felt along 5th Road and Atlantic Street, which would affect access into and out of private residential properties along these roads and potentially increase the potential risk of accidents and driver stress. These roads are already main vehicle access routes to the existing Waterfront, Namport Expansion terminal and port, and therefore experience high levels of traffic. The Transport Impact Assessment (Appendix G) recorded up to 300 trucks along 5th Road at the Namport access between 06:00 and 18:00 during a normal weekday, and a similar number of truck trips delivering salt to the harbour.

The sensitivity of residents along these routes is considered to be low, as people are used to high levels of traffic and are not particularly sensitive to change as a result. The construction traffic associated with the proposed project is also predicted to be significantly less then what the local community has been exposed to during recent activities associated with Namport.

The volumes of construction traffic will not be constant through the construction works; the number of vehicles used will based on the construction activities and site requirements. Construction traffic shall follow a defined route to and from the site, and traffic will be managed and controlled through the use of banksmen. The duration of the impact from construction vehicles will be limited to the construction phase, therefore is short-term and temporary. The magnitude of change is therefore determined to be minor as the number of vehicles is expected to increase slightly from the current baseline. The significance of impact is therefore assessed to be adverse low.

The Esplanade will be closed early on in the construction schedule and diversions will be put in place to divert traffic up KR Thomas Street to 5th Road. The section of road that is lost will be replaced with the Waterfront Drive, however this will not be available until towards the end of Phase 1 construction works. The users of the road are considered as the receptor. The sensitivity of the receptors is considered to be low and the magnitude of change is minor (as per the assessment in the Protea Hotel assessment), as there is a partial loss of a resource, however is not considered to adversely affect the integrity of the traffic infrastructure and alternatives are available. Even though the loss of the section of road is permanent, the impacts are considered short term as local road users will become accustomed to the diversions. The significance of impact is therefore considered as low.

An increase in traffic along KR Thomas Street and possibly 4th Road may result in disruption to access to properties during construction. Residents along this route are not use to high volumes of traffic, and therefore are considered to be medium sensitive receptors. Construction traffic will not access the proposed project site via these roads; normal vehicles will be diverted along these routes. With a lack of traffic data for the Esplanade, it is assumed that the magnitude of change could be moderate as there would be a noticeable difference from the baseline and a loss of resource. The duration of the impact would be felt most during construction, but may continue into operations, therefore the impact could be long-term and permanent. Whilst minor disruption is expected, the degree of severance is considered to be low as access would not be severely hindered or restricted, resulting in a minor magnitude impact and a minor adverse impact.

8.1.1.19 COMMUNITY SEVERANCE DURING ROAD UPGRADES

The Transport Impact Assessment (Appendix G) was undertaken to investigate the expected transport impacts from the proposed project. The assessment concluded that certain road sections and intersections may not have the required capacity to accommodate predicted future traffic flows during the operational phase therefore there is an increased risk of accidents, driver stress and road deterioration. To mitigate this issue, upgrades were recommended, which are described in section 4.7.9.

The works required to upgrade the road sections and intersections will be limited to the existing road boundary and will be a short duration. The changes will be permanent, but will provide improvements to the existing baseline. During construction, temporary closures of lanes may be required, reducing roads from a dual carriage way to a single carriage way or a single carriageway to one lane with appropriate road signals or diversions. It is not anticipated that access to properties will be impacted and the works will not alter the flow of traffic. It is therefore considered that the significance of impact during construction is adverse low and during operations is beneficial low.

8.1.1.20 COMMUNITY SEVERANCE DURING OPERATIONS

The Esplanade by the Protea Hotel will be permanently closed, and an alternative route will be via the new Waterfront Drive. The loss of The Esplanade has been assessed above in construction, and therefore will not be repeated here. The addition of the new Waterfront Drive will provide an alternative route and alter the baseline again. Road users (considered as low sensitive receptors) will become familiar with the new road layout therefore the nature of impact is considered to be short-term impact but a permanent change. The magnitude of change is therefore considered to be minor, and brings both positives and negative impacts, with an overall significance rating of low adverse.

During operations, traffic movements in the area will increase due to journeys to and from the proposed project site. The main vehicle access route to the proposed project site will be clearly signposted along 5th Road and Atlantic Street, and other roads leading to these streets. It is inevitable that some traffic movements will use the Esplanade and KR Thomas Street, with potential knock on impacts to 4th Road, 3rd Road and 2nd Road. As with the construction assessment, the impacts will be most felt along KR Thomas Street, and possibly 4th Road and other minor roads in the area. The increased traffic volumes may disrupt access to properties along these roads as well as increase driver stress and the potential for accidents. As per above, the residents along these routes are not use to high volumes of traffic, and therefore are considered to be medium sensitive receptors.

The indirect impacts will affect the local community over the long-term which are considered irreversible in nature. The local community will however gradually become accustomed to the change in the baseline, therefore the magnitude of change is considered to be medium. Traffic calming measures are also integrated into the road upgrades; therefore a moderate adverse impact is therefore predicted.

8.1.1.21 Summary Community Severance Impacts

Table 30 - Impacts on community severance

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Construction – The Esplanade stopped up	– Community – Residents	Loss of access road	Adverse Indirect Local Short Term Irreversible	Low	Minor	Adverse Low (2)
Construction – increase in traffic	– Community – Residents	Increase in traffic volumes along 5th Road and Atlantic Street – affecting private access, increase collision risk and driver stress.	Adverse Indirect Local Short Term Irreversible	Low	Minor	Adverse Low (2)
Construction – closure of The Esplanade	– Community – Residents	Change of traffic flow, increase in traffic volumes along KR Thomas Street and potentially 4th Road – affecting private access	Adverse Indirect Local Short Term Irreversible	Medium	Minor	Adverse Minor (4)
Road upgrades - construction	– Community – Residents	Access to private residential properties and impact to flow of traffic	Adverse Indirect Local Short Term Temporary	Low	Low	Adverse Low (1)
Road upgrades - operation	– Community – Residents – Users of the proposed project	Upgrades to the road infrastructure improving road conditions	Beneficial Indirect Local Short Term Permanent	Low	Minor	Beneficial Low (2)
Operations – Opening of Waterfront Drive	– Community – Residents – Users of the proposed project	New Waterfront Drive	Adverse Indirect Local Short-term Permanent	Low	Minor	Adverse Low (2)
Operations	– Community – Residents	Increase in traffic volumes along KR Thomas Street and potentially 4th Road and other minor road, – affecting private access, increase collision risk and driver stress.	Adverse Indirect Local Medium-Term Irreversible	Medium	Moderate	Adverse Moderate (6)

8.5.2. Impacts on Community: Bulk Services

The proposed project site has existing infrastructure running through it, which will need to be rerouted. As a result of the proposed project, demands on bulk services will increase, therefore the infrastructure will not only be rerouted, but also upgraded. These bulk services include sewerage, water, power and utilities. The sewerage line in particular has severe deficiencies and cannot accommodate the current demand. A new and upgraded sewerage line and pump station will be constructed to cater for the increased volume.

8.1.1.22 Bulk Services: Construction

Some service users may be subjected to temporary interruptions when the services are changed over to the new system during the testing phase. This period should be no more than 24 hours and adequate notice and information

would be supplied to all service users prior to any service interruption. Peak times, such as weekends would be avoided.

The sensitivity of the receptor is considered medium due to the importance and the provisions of adequate waste services, and limited potential for substitution. Users are used to a deficient system, therefore a temporary short-term loss of services which will be scheduled appropriately with prior notice provided, is considered to result in a minor magnitude of change. It is therefore anticipated that the impacts will be adverse low.

8.1.1.23 Bulk Services: Operation

Once the new system has been swapped to, the local users will have an upgraded system which has been designed to accommodate the proposed project, local community and potential future growth in the area. These improvements and benefits felt by the users have been assessed to be of a moderate magnitude of change. The significance of the impact is therefore considered to have a moderately beneficial effect on the users.

8.1.1.24 Summary of Impacts on Community Bulk Services

Table 31 – Potential impacts associated with bulk services

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Rerouting and change-over of bulk services	– Service users	Temporary loss of services	Adverse Direct Local Short term Temporary Reversible	Medium	Low	Adverse Low (1)
Installation of new bulk services	– Service users	New and improved services	Beneficial Direct Local Long Term Irreversible	Medium	Moderate	Beneficial Moderate (6)

8.5.3. Community Facilities

The proposed project site is currently occupied by a cricket oval and cricket clubhouse, swimming pool, tennis and jukskei courts, and green open spaces with established palm trees and other vegetation. The proposed project will be developed on the whole site and these facilities will be relocated and their areas replaced with hotels, restaurants, commercial business and residential properties. Open areas are designed and integrated throughout the development, however the current sporting facilities will no longer exist on the site. The cricket oval and cricket clubhouse will be relocated to Kuisebmond and the swimming pool, tennis and jukskei courts will be relocated to Jan Wilken Stadium. The area surrounding the proposed project site has green spaces, including a playground less than 300m away.

The impacts on the sites used to relocate the sporting facilities are discussed in Section 1.10. The impacts of a temporary loss and relocation of local sporting facilities away from the site is discussed in this section.

8.1.1.25 Loss of Sporting Facilities: Construction

During the Phase 1 construction, the swimming pool, tennis and jukskei courts will be demolished and new facilities will be relocated. There will be a period of time where these facilities will not be available for use. The cricket clubhouse will also be demolished to enable construction works, however a temporary facility will be replaced on site. In Phase 2, the cricket oval and cricket club will be relocated to Kuisebmond.

Whilst these facilities are temporarily lost, other facilities at Jan Wilken and Sparta can be used, as well as other open green spaces in and around the area: approximately 3,500m^2 of open space is available along the esplanade within 1km of the site, as well as a playground 300m south of the proposed project site between 2nd and 3rd Road. An increase in users of these other facilities may be felt, however this will be short term and temporary.

A temporary loss in sporting facilities will potentially result in a moderate adverse impact. There will be a temporary loss of sporting facilities (swimming pool, tennis and jukskei courts, and cricket oval) and a complete loss of the outdoor swimming pool and green areas, which are all considered to be of medium sensitivity because of their importance to the town and local community and have limited potential for substitution during. The most significant impact will be the loss of the outdoor swimming pool and associated green areas and open spaces where people braai and congregate. This will not be directly replaced; however, alternatives are available and open spaces have been integrated into the final design on the proposed development.

8.1.1.26 Available Sporting Facilities: Operations

The relocated sporting facilities will be sited at two sites; Jan Wilken and a site in Kuisebmond. These sites are approximately 2.3km and 5.3km away respectively. An alternative cricket pitch, tennis and jukskei courts are approximately 1.3kmaway at Sparta; however, an alternative swimming pool is not available. Some users of the existing sporting facilities on the proposed project site may have to travel further to use these alternative facilities. This could result in an inconvenience to these people, which are considered to be low sensitive as people have the capacity to change. The change to the existing baseline will be permanent and could result in an adverse impact of a minor magnitude of change. The impact has therefore been assessed to be low adverse.

8.1.1.27 Summary of Impacts on Community

Table 32 – Potential impacts associated with the Community

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Proposed development – land use	– Community – Residents	Temporary loss sporting facilities used by local communities, permanent loss of green space and outdoor pool	Adverse Direct Local Temporary Irreversible	Low	Moderate	Adverse Minor (3)
Relocated sporting facilities	– Community – Residents	Inconvenience to existing users	Adverse Direct Local Permanent Irreversible	Low	Minor	Adverse Low (2)

8.5.4. Noise Impacts

The proposed project site is adjacent to a residential area, the coastline and an industrial area. Noise levels will increase as a result of the construction and operational activities at the proposed project site.

Noise impacts on marine mammals are assessed and presented in section 8.6 and therefore has not been discussed in this section.

8.1.1.28 Noise Impacts on Receptors from Construction Site Activities

Noise levels are expected to increase as a result of construction activities. The main sources of noise will be from:

- Construction vehicles moving on site;
- Demolition activities;
- Earthwork activities;
- Piling activities;
- Construction of marina wall – movement of rocks; and
- General construction activities such as drilling and loading and unloading material.

Noise data from the Namport Expansion Terminal Project EIA has been used to define the baseline, along with a number of assumptions and the use of SANS 10103:2008. It is assumed that the noise baseline along Atlantic Street is between 66.6aB(A) and 68.3dB(A) during afternoon peak times, and less during morning and nighttime peak times. Noise levels along KR Thomas Street and 4th Road are approximately 55dB(A), increasing towards Atlantic Street and 5th Road.

Human receptors opposite the proposed development site are those that are most likely to be affected by the construction works. Receptors within 200m of the proposed project site boundary are also likely to experience disruption from noise, however noise will reduce the further away from site the receptor is. Receptors further away are likely to only hear noisy activities which will be limited to short periods and during specific times. The impacts on receptors directly opposite the site on the Esplanade, KR Thomas Street and 4th Road have been assessed as these impacts will be the worse.

The South African noise control regulations describe disturbing noise as any noise that exceeds the ambient noise by more than 7dB. Noise levels will vary depending upon the type, duration and frequency of equipment used, the location on site and climate conditions, in particular wind and rain. It is predicted that noise generated from general construction activities will increase the baseline levels by more than 7dB(A) for the majority of the construction works. Noisy activities may see an increase of potentially double this value, however this would be for short durations of times.

Receptors (residents and hotel guests) along the Esplanade, KR Thomas Street and 4th Road are within 30m of the site with no structures to attenuate the noise. Receptors are considered to be medium sensitive as they sensitive to change. Receptors are located along quiet roads compared to the surrounding roads and the majority of the area is residential.

Noisy activities would be scheduled around sensitive times and between 7am and 6pm during weekdays. Notice will be provided to local residents and receptors prior to undertaking noisy activities. The site would also have a boundary fence made of material to reduce noise, dust and visual impacts of the site (e.g. hoarding), which would provide some noise attenuation. However, with these mitigation measures, the nature of the impact will be adverse and short-term. The change to the baseline conditions will be temporary; however, will have a major magnitude of change. The impacts of construction noise on local receptors has therefore been assessed as being of moderate adverse.

8.1.1.29 NOISE IMPACTS ON RECEPTORS FROM CONSTRUCTION TRAFFIC

During the construction stage, there will be an increase in construction traffic on the local roads approaching and around the proposed project site. During the construction of the marina, there will be approximately 50 truck movements per day to and from the site over a six-month period. After this period, the number of vehicles is likely to be less than this number, and will be needed to deliver and remove plant, equipment and waste.

It is predicted that there will be around six truck movements per hour along designated routes to Industrial Zone 14. Local residents and other noise sensitive receptors such as schools and churches, may see a small increase in noise levels as a result of this intermittent short-term activity. This change in baseline is expected to be small; the nature of Walvis Bay is industrial, and there are regular trucks and high levels of traffic on the roads as a result of industrial activities like the Salt Works and Namport operations. Therefore, it has been assessed that a minor adverse impact may occur as a result of increasing noise levels during construction.

8.1.1.30 NOISE IMPACTS ON RECEPTORS FROM OPERATIONS

The final design has considered local residents by designing the anticipated noisier components of the development on the north side of the site (e.g. commercial and car parking) and residential properties to the south and east of the site, opposite residential properties. There is still potential for the current noise levels to increase as a result of the proposed project, from sources such as increase people visiting the area, increase in residents in the area and addition of commercial (retail) properties.

This increase will be long term for the duration of the operations of the proposed project, and shall result in negative impacts to sensitive receptors including local residents, customers of the Raft and the Protea hotel. The change to the baseline is considered to be of moderate magnitude, as there will be measurable change to the current baseline. The local residents are sensitive to change; however, they should become accustomed to the change in the environment, and therefore are considered as being medium sensitivity. The proponent would hold quarterly forums to ensure all comments, concerns or complaints are recorded and appropriate actions are taken to minimise impacts on the community. With mitigation measures, the significance of impacts is considered to be moderate.

8.1.1.31 NOISE IMPACTS ON RECEPTORS FROM TRAFFIC DURING OPERATIONS

The volume of traffic on roads is likely to increase as a result of the proposed project. It is anticipated that at peak times (see Table 12) there is potential for over 1,000 vehicles per hour to enter the site, a major magnitude of change (increase) from the baseline. Although local residents and other sensitive receptors along the main vehicle routes to and from the Namport Container Terminal and the Salt Works are used to high traffic levels and thus noise levels, this increase will be a noticeable change. The minor roads around the proposed project site are also likely to experience increased levels of traffic and thus noise. This increase in traffic would result in an increase in noise and thus adversely impact sensitive receptors. This impact is considered to be of moderate significance.

8.1.1.32 SUMMARY OF NOISE IMPACTS ON RECEPTORS

Table 33 - Impacts to the community due to increased ambient noise levels

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Construction activities on site	– Community – Residents	Increased ambient noise levels – nuisance for local residents	Adverse Direct Local Short Term Reversible	Medium	Moderate	Adverse Moderate (6)
Construction Traffic	– Community – Residents	Increased ambient noise levels – nuisance for receptors along transport route	Adverse Direct Local Short Term Reversible	Medium	Minor	Adverse Minor (4)
Operations – from the proposed project site	– Community – Businesses – Residents	Impacts on sensitive receptors due to increased ambient noise levels - operations	Adverse Indirect Local Permanent Irreversible	Medium	Moderate	Adverse Moderate (6)
Operations – increase in traffic	– Community – Businesses – Residents	Increased ambient noise levels – nuisance for receptors along transport route	Adverse Indirect Local Permanent Irreversible	Medium	Moderate	Adverse Moderate (6)

8.5.5. AIR QUALITY

The proposed project site is sandwiched between a residential area, the coast and an industrial area. There are limited industrial activities in Walvis Bay that adversely affect the local air quality, which is considered to be good. Operating plant and equipment will result in emissions from the combustion of fuel, releasing pollutants into the air, the most concerning ones being nitrogen dioxide and particulate matter. It is very unlikely that the existing local air quality will be impacted by the emissions during the construction works, and therefore is not discussed further.

Dust will be generated from construction activities and may impact the local air quality.

8.1.1.33 DUST IMPACTS ON SENSITIVE RECEPTORS

Dust will be generated from the proposed project site during the construction activities through vehicle movements, demolition activities, site levelling, road construction and short-term stockpiling of dredged or fill material. Dust may become airborne and settle on surrounding properties. It is considered both a nuisance problem and health issue.

The potential dust generated in the proposed project location will generally be coarse consisting of sand and fill material, with limited potential to become airborne. The prevailing wind direction is south-west-west (Iowa State University, 2018), therefore any dust becoming airborne is likely to be carried away from sensitive receptors.

Local receptors are the same as those considered in the noise assessment, and a similar zone of influence is applicable to dust impacts (200m). Dust can potentially cause health issues, and to a lesser impact, can accumulate on properties and become a nuisance. Local receptors are used to sand and dust issues due to the surrounding environment and strong winds, therefore are considered to have low sensitivity.

The construction works are short-term and temporary. The construction site will have a solid fence (hoarding) around the site thereby limiting the potential for dust to be transported off site and good construction methods will be

implemented to minimise dust arising and becoming airborne, such as minimising dust works during high winds. Where required, water would be sprayed on surfaces and stockpiles to reduce air borne dust and construction vehicles will have speed restrictions (on and off site). Specific activities would avoid high wind periods, and stockpiles would be avoided on site.

The transportation of dredged material from the proposed project site to Industrial Zone 16 will be undertaken along specific routes, which would be cleaned of sediments if required. The material will be covered to avoid dispersion and in the event of very windy events, transportation shall be ceased. Appendix A provides further measures to avoid and minimise dust impacts.

The magnitude of change is therefore considered to be minor as there will be some measurable change to the receptors. The significance of impact is predicted to be low, however it is recognised that the nuisance is of concern to local residents, therefore suitable mitigation has been identified.

8.1.1.34 Summary of Impacts on Air Quality

Table 34 - Impacts to community due to dust generated during construction

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Waterfront Construction – general activities	– Community – Residents	Dust generated during construction activities affecting local residents properties (nuisance) and potentially health	Adverse Direct Local Short Term Reversible	Low	Minor	Adverse Low (2)

8.5.6. Sense of Place

The proposed project site is located next to a residential area to the south and east, an industrial area to the north (harbour area), and the Lagoon to the west. Residential properties along KR Thomas Street and 4th Road over-look the proposed project site, as does the Protea Hotel on the north-west side of the site. The proposed site is currently occupied by sporting facilities and green open spaces with established palm trees and other vegetation.

The assessment for sense of place analysed the potential impacts from the changes to the character of the landscape, residential amenity (residential views and light – noise has been assessed in the noise assessment) and changes to the existing sense of place. This assessment does not consider the impacts of a loss of community facilities, this has been assessed and presented in section 8.5.3.

8.1.1.35 Changes to Existing Sense of Place: Operations

Although a perceived convenience, the sense of place experienced by the local community may be impacted through the development of the proposed project. A sense of place can be defined in many ways; it can be defined as characteristics that a geographical area has, the perception held by people of a place or a place that has certain characteristics that fosters a sense of authentic human attachment and belonging.

The proposed site is a community site which contributes to the characteristics of the area. A new development in the area that will take away this characteristic and introduces a different characteristic may alter the sense of place for local residents and the community. This change can be perceived both positively and negatively and varies from person to person. Assuming the worse-case scenario is that the change to sense of place is considered negative, the potential impact could affect the receptor (local residents and community) directly for the long term, however people adapt and over time will be accustomed to these changes, therefore it is considered as a temporary change.

The magnitude of change to the receptor compared to the current baseline is considered major due to the changes to key features and characteristics of the environment. The significance of the impact is therefore assessed to have a moderately adverse impact on the receptor.

8.5.7. Residential Amenity: Construction

Residential properties that line KR Thomas Street and 4th Road, and potentially some that are located on adjacent roads have views into the proposed project site, and some have unobstructed views looking towards the Lagoon. Not all properties will have views onto the site and the Lagoon as many have high security walls or are less than two stories. The existing lights in the area are downward facing street lights as well as some lighting seen from the Namport Harbour.

During construction, the proposed project site will change from a community site into a construction area, with large plant and equipment, and some lighting for health and safety reasons. Construction works will not occur during the night; therefore, lighting will be limited to daylight hours. The construction period is considered as short-term; however, the views of the existing community site will be lost permanently. A visual screen will be placed around the site, which will mitigate most of the views into the area, however properties which are two stories or higher may still see into the site. Where lights are required, downward facing lights will be used.

Due to the magnitude of change from the baseline being moderate and the receptors considered as being highly sensitive, the significance of impact has been predicted to be adverse moderate.

8.5.8. Residential Amenity: Operation

The proposed project will introduce a completely different view for residents surrounding the site; rather than a green open area with low buildings, a more built-up area with buildings ranging from two stories high to seven. Residents along KR Thomas Street and 4Th Road will have views overlooking the residential zone of the proposed project. Views into the Lagoon from properties along 4th Road will be obstructed as a result of the development.

Buildings developed on the perimeter of the site will set back into the development to prevent blocking the sun and creating shade into neighbouring houses. Street lights will be replaced on a like for like basis as existing arrangements, and any lighting around the marina will be directed away from residential properties.

The change in residential amenity (view and light conditions) is considered to be a moderate magnitude of change from the baseline; the change is permanent and localised, however the impacts felt by the receptor will reduce over time as people become accustomed to their surroundings. The area would not be rendered as an unattractive place to live; therefore the impact has been assessed as being adverse moderate significance.

8.1.1.36 Landscape and Seascape Character

The area where the proposed project site is located is dominated by the Lagoon, residential area and Namport Container Terminal. Vegetation such as palm trees and other trees and vegetation enhances the area, particularly along The Esplanade road running parallel to the Lagoon and along KR Thomas Street. Residential properties are no greater than three/four stories high, and the container terminal stacks containers no higher than five. The Raft Restaurant plays an important feature in the seascape character as does the shallow Lagoon and coastline.

The proposed project will utilize an area which currently occupies sporting facilities, and will alter both the local landscape and seascape character of the area due to the integration of commercial and additional tourist facilities. The landscape and seascape character of the area is valuable to the local community and therefore considered to be a medium sensitive receptor.

Construction activities will result in the removal and relocation of the existing facilities, turning the area into a construction site. The area will be fenced off with a block-out structure, thereby minimizing impacts on the surrounding area. The construction phase will be short-term, however will alter both the local landscape and seascape character considerably. The magnitude of change is minor as most of the impact will be felt during operations. The impact during construction is therefore predicted to be as adverse minor.

The loss of open green space and integration of built development, change to the seascape and coastline. These features along with consultation feedback, have influenced the design. Open spaces are incorporated into the design as well as an inner marina; vegetation will be retained and reestablished around the site; building material will be sourced locally allowing the buildings to blend in with existing buildings and the natural environment; and the design, position and setting of the buildings have taken into consideration sunlight and residential views. Lighting will be designed to minimize spill on to adjacent properties and downward lighting will be used where possible.

During operation the magnitude of change from the existing baseline is considered to be both positive and negative: the landscape and seascape character will change considerably, however the area surrounding the site is already built up. The seascape will have the most impact as there are limited developments that border the Lagoon front and marine buoys will be required permanently to mark the approach channel. The development will integrate features along the shoreline including the Raft and the Protea hotel. The change will permanently alter the character of the landscape and seascape; however, it will be localised. The magnitude of change is therefore considered to be moderate and the potential impact to be adverse moderate.

8.1.1.37 Summary of Impacts on Sense of Place

Table 35 - Impacts to community due to changes in sense of place

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Operations – new features	– Community – Businesses – Residents	Changes to the sense of place	Adverse Direct Local Long-Term Temporary	Medium	Major	Adverse Moderate (6)
Construction – general construction activities	– Community – Businesses – Residents	Neighbouring Properties visual amenity impacted by development	Adverse Direct Local Permanent Irreversible	Medium	Moderate	Adverse Moderate (6)
Construction – general activities	– Community – Businesses – Residents	Seascape and landscape character altered	Adverse Direct Local Short term Temporary	Medium	Minor	Adverse Minor (4)
Operations – new development	– Community – Businesses – Residents	Seascape and landscape altered	Adverse Direct Local Long-term Permanent Irreversible	Medium	Moderate	Adverse Moderate (6)

8.1.1.38 Additional Mitigation

To ensure the proposed project site integrates with the local surroundings and that any soft landscaping (vegetation) has successfully established, management and maintenance measures will be required. Details of the measures are contained in the Operations ESMP, Appendix A.

8.6 The Marine Environment: Hydrodynamics & Water Quality

Impacts on the hydrodynamics and water quality of the marine environment has been assessed and reported in this section. The significant hydrodynamics and water quality impacts or impacts that have specific interest to the community and stakeholders are summarised in Figure 61.

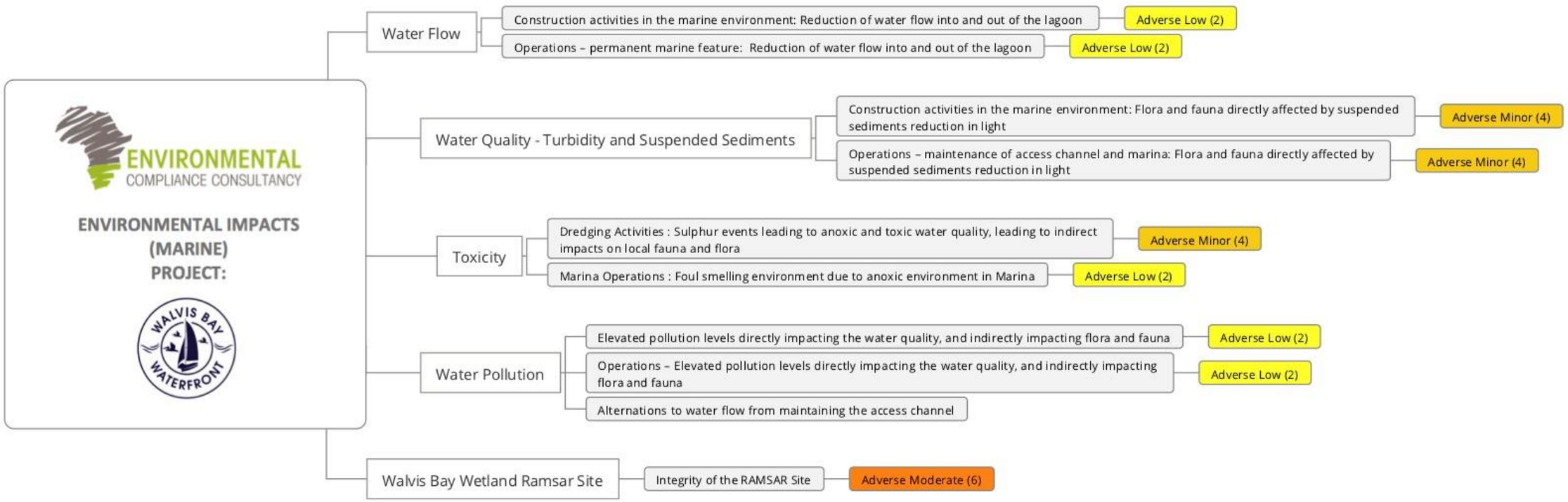


Figure 61 – Hydrodynamics and water quality impacts

8.6.1. THE LAGOON

The proposed development includes a new marina that will be constructed on the coastline, immediately south of the mouth of the Lagoon. The Lagoon forms part of an area that is designated as the Walvis Bay Wetland Ramsar site. Tourism and recreational activities are undertaken in the Lagoon and Bay area. The hydrodynamics of the Lagoon are fundamental to Lagoon's environment and associated ecosystems, in particular the water quality and flow of water (currents and tides) are fundamental to the functions of the Lagoon. The Lagoon directly interacts with the wetlands, and therefore supports vast populations of resident and migratory birds of various species (approximately 40% of the total number of waders in the wetland are found in the Lagoon). The Esplanade along the eastern shore of the Lagoon affords visitors and locals the opportunity to view flamingos, pelicans, waders and other coastal birds from close range.

The dynamics of the Lagoon and supporting features are therefore considered as national value and has moderate sensitivity to change due to the potential direct and indirect impacts; thus classified as medium sensitivity and value as per Table 18. This sensitivity is applied to the following sections which investigates how the water quality of the Lagoon could be affected, focussing on water flow, turbidity (suspended solids), pollution and toxicity levels.

Significant indirect impacts as a result of the change of water quality are discussed separately: the impacts on birds and marine mammals is discussed in sections 8.7 and 8.8 respectively. As stated above, the Lagoon forms part of the Ramsar site, which is considered as an individual receptor due to its international importance. The impacts on the Ramsar site are discussed in section 8.6.7. The assessment presented in this section considers the combined impacts on the various attributes that combine to form the complex Lagoon ecosystem. This then feeds into the assessment on the Ramsar site the Lagoon forms an important feature of this international valued site.

8.6.2. WATER FLOW: CONSTRUCTION

During construction, various plant and equipment will be within the marine environment to enable the construction of the marina, which will be limited to a designated working area to minimise potential impacts on the marine environment. The Marina wall will be one of the first construction activities which will form a new solid structure in the Lagoon. The presence of this structure has been assessed and presented in section 8.6.3.

No other solid structure will be present in the marine environment during construction, therefore it is unlikely that the natural flow into and out of the Lagoon will be affected. Therefore, the potential impacts are predicted to be low as the potential magnitude of change is expected to be negligible.

8.6.3. WATER FLOW: OPERATIONS

The design of the marina has been developed through an iterative process as described in section 5.4.1. Through this process, several potential impacts to the marine environment have been designed out, in particular the potential impact on the flow of water into and out of the Lagoon. The layout of the Marina wall and the orientation of the Access Channel have taken into consideration the main natural tidal channel and flow of water into and out of the Lagoon, the currents and natural siltation.

The Marina wall will extend approximately 40 to 50m into the Lagoon and therefore there is potential for the natural flow into and out of the Lagoon to be affected and thus a hydrodynamic study was conducted. The hydrodynamic study report (Appendix I) concluded that the flow velocities at the Lagoon mouth and the refreshment rate of the Lagoon may slightly be affected by the presence of the Marina – see Figure 62 and Figure 63. The flow velocities are expected to deviate by a maximum of 3mm/s, which is considered to be a negligible magnitude of change.

During neap and spring tide conditions all discharge parameters (average, max flood, max ebb) across the indicator line at the Lagoon entrance show negligible differences between the existing situation and the situation with proposed project. The deviations are generally below 0.3% with one outlier (scenario 1 max ebb velocity). Changes in

flow direction as derived from the modelling are mostly below 0.5 degrees, with one maximum difference of 2.5 degrees. These changes are also considered to be minor, therefore resulting in a low significant adverse impact.

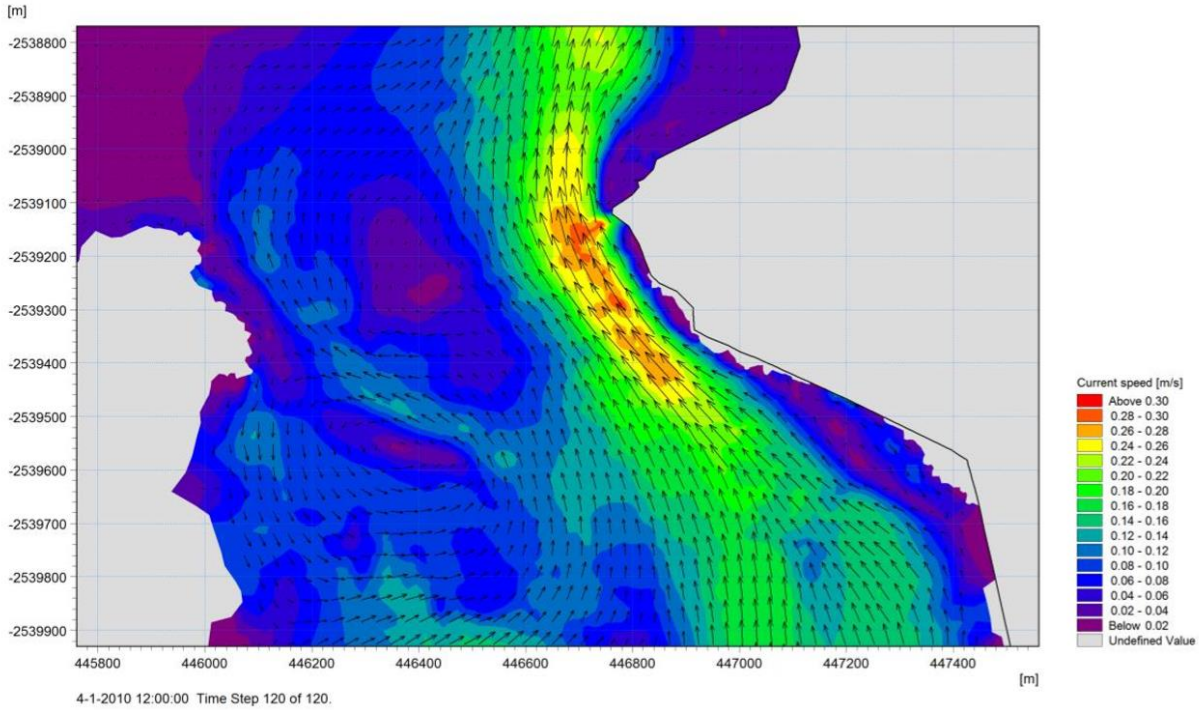


Figure 62 – Typical existing ebb current pattern (Appendix I)

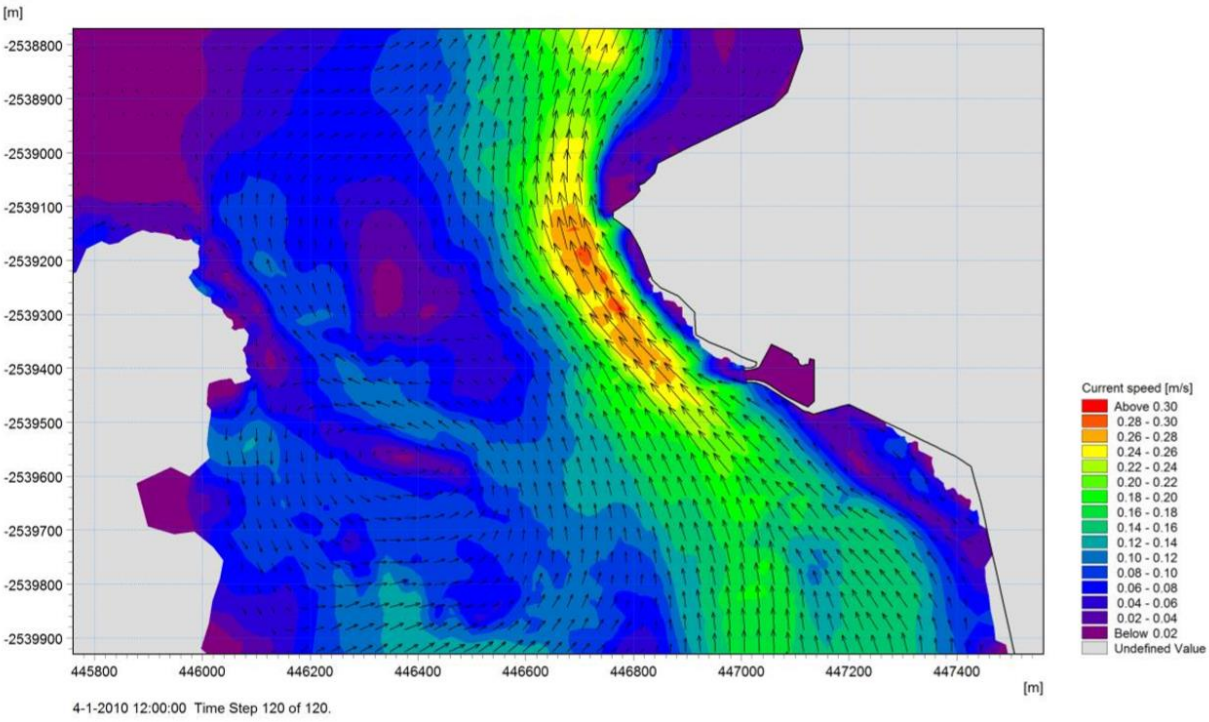


Figure 63 – Typical ebb current pattern with proposed development

8.6.4. WATER QUALITY: TURBIDITY & SUSPENDED SEDIMENTS

The sea floor of the harbor has a soft substrate/mud sediment bottom, and the mouth of the Lagoon is composed of coarse and medium sands. Due to the anoxic conditions of the Bay and Lagoon, the biodiversity is limited to a few species that can tolerate the environment (see Section 6.23.11).

8.1.1.39 SUSPENDED SEDIMENTS: CONSTRUCTION

Construction activities will be undertaken in the marine environment to enable the construction of the marina wall and the deepening of the Lagoon access channel and the Marina Access Channel. Associated construction activities such as piling, offloading of rocks and dredging will have the potential to disturb and increase suspended sediments in the Lagoon and Bay area. A gravel dredge pump system and vibratory piling techniques will be applied; however, alternatives are currently being investigated, including a more environmentally friendly dredger (Watermaster) as discussed in Section 4.7.4.6. The most appropriate techniques shall be identified to minimise suspended solids.

If utilised, the Watermaster would minimise suspended solids entering the water column, therefore by applying the precautionary principal, the worst-case scenario has been applied to the assessment. The gravel dredge reclamation system has been assessed which involves undertaking dredging activities on the outgoing tide. With either dredging option, a closed bund would be built and used during the construction process. Mr Alan Louw would monitor all dredging activities and turbidity monitoring will be undertaken in specific areas in the Lagoon. Environmental thresholds will be set (see Section 0 and the ESMPs) and should these be exceeded during dredging, a silt curtain will be deployed. Sequencing and scheduling of dredging activities have also been designed to take into consideration the potential impacts from suspended sediments. Further detail of mitigation measures are detailed in the ESMPs (Appendix A).

It is however possible that some sediments will become suspended during these activities, leading to suspended sediments into the water column. The release of potentially contaminated sediments and the impacts is discussed in sections 8.6.5 and 8.6.6. Increase suspended sediments can affect filter feeding organisms, such as shellfish, through clogging and damaging feeding and breathing equipment. Similarly, young fish can be damaged if suspended sediments become trapped in their gills and increased fatalities of young fish have been observed in heavily turbid water. Adult fish are likely to move away from or avoid areas of high suspended solids, such as dredging sites, unless food supplies are increased as a result of increases in organic material. This could have an indirect impact on the avian community, see Section 8.7.5. A reduction in light can occur affecting seaweeds and plants, and temporarily reducing productivity and growth rates, and the settlement of sediments can result in the smothering or blanketing of sub tidal communities and/or adjacent intertidal communities. Sedimentation can result in smothering habitats in the area or downstream, which may be food sources for marine fauna.

The turbidity of the Bay area is considered to be relatively high due to the natural hydrodynamics from the Bay area, but also as a result of existing dredging operations associated with Namport. The Bay is flushed twice daily through water circulation, with the Lagoon being refreshed through these currents. The existing eastern natural channel into the Lagoon has the highest current rates. The Hydrodynamic Study (Appendix I) states that infrequent short-term dredging with appropriate environmental management, is unlikely to result in an impact to the water quality through increased sedimentation, thus no change to the baseline is expected to occur.

Taking into consideration the above: the nature of the activity; the potential change to the baseline; and the mitigation measures, the magnitude of change is considered to be minor, and the overall significance of impact has been assessed to have a minor adverse.

8.1.1.40 SUSPENDED SEDIMENTS: OPERATIONS

During operations, there will be a requirement to dredge the Access Channel approximately every two years and the Outer Marina every 5 years to maintain depth and safe nautical access, as well as reduce decomposing flora and fauna

in the marine environment. The duration of dredging operations will be short term and temporary, and will occur in specific localised areas. As stated above, the Hydrodynamic Study (Appendix I) states that infrequent short-term dredging is unlikely to result in an impact to the water quality through increased sedimentation. If any impact occurs, it will be localised and only last for the duration of the dredging activities, and mitigation measures (see Section 8.6.4) therefore a low adverse impact is therefore predicted.

8.6.5. Toxicity: Construction & Operations

The sediment on the Lagoon and Bay floor is rich organic sediment which is usually anoxic due to the depletion of dissolved oxygen and has a number of environmental pollutant contaminants. Aerobic decomposition of organic material within the sediments results in the generation of methane, sulphur dioxide and hydrogen sulphide gasses that become trapped within the layers of organic-rich, anoxic mud. The disruption of sediments can lead to a sulphur eruption as a result of the accumulation and release of these gases, which leads to reduced dissolved oxygen resulting in mass mortality of the local marine community, and potentially indirectly impacting local birds.

Construction activities in the marine environment, in particular dredging, can lead to the disruption of sediments and therefore a sulphur eruption, as well as the release of environmental pollutants resulting in the water becoming anoxic and toxic. Dredging and other construction activities in the marine environment will be short term and methods and equipment have been chosen to minimise impact to the marine environment (see section 8.6.4). The potential changes to the baseline (anoxic and toxic conditions) will be temporary and localised, and would unlikely lead to indirect impacts on local fauna and flora great than a minor magnitude of change. The level of significance has been assessed to be of minor adverse on marine flora and fauna, and the Lagoon ecology.

These sulphur events could also result in foul smells being emitted indirectly impacting the local community. These events have been assessed as having a low adverse impact on the local community due to the duration of activities and the events already being a common occurrence in Walvis Bay.

During operations, there is limited opportunity for considerable sulphur eruptions to occur and impact the marine environment or the local community. The Marina Access Channel will be dredged every two years and the Outer Marina every five years, thereby regularly releasing organic material and trapped gases, and reducing the natural build up. There may be a beneficial impact as a result of these dredging activities as fewer episodes may occur naturally.

8.6.6. Water Pollution: Construction & Operations

As a result of activities in the Bay area, including the Harbour and fishing industry, there is potential for existing elevated pollutants (heavy metals and organic compounds) to be present in the marine sediments. There is therefore potential to disrupt these pollutants during dredging activities (construction and operation), impact the local water quality and potentially spread pollutants into the Lagoon. The proposed project will not contribute to these pollutant levels.

Elevated pollutants have the potential to indirectly impact the flora and fauna of the Lagoon, as well as downstream users such as the Salt Works. There have been no reports of significant long-term impact related to the regular maintenance dredging undertaken by Namport in Walvis Bay Harbour (Appendix J and see limitations).

Pers comms with Mr Alan Louw 14th February 2018 confirmed that is it widely known in the Walvis Bay community that heavy metals are found in the sediments of the port area, however heavy metals are not found in the sediments in the Lagoon. Sediments analysed by Namport in 2006 also confirms this; the Lagoon area, including the channel has less than 1mg/kg of cadmium concentration, which is below the BCLME TEL. Whilst this data is 12 years old, it is considered unlikely that dredging activities within the Lagoon will mobilise heavy metals, however, to further mitigate this potential risk, dredging operations will have specific mitigation measures, depending on the preferred technology identified and utilised, for example dredging operations will only occur on the outgoing tide and at certain times of

the year (see section 8.6.4). Turbidity monitoring will be undertaken throughout, Mr Alan Louw will oversee all dredging works and a bund will be established to control the movement of sedimentation. It should also be noted that if heavy metals become suspended, they are likely to settle within approximately five hours, and in combination with the outgoing tide, they would be swept into the Bay and not the Lagoon. It is therefore considered, that the risk of causing a significant impact due to suspension and spread of heavy metals is low and the environmental impact is considered to be of low significance.

During operations, there is potential for boat users of the Marina to lose oil or fuel, thereby resulting in a localised adverse impact. Potential spills and incidents will be avoided through regular maintenance of boats and refuelling will be undertaken in controlled areas. The likelihood of a large spill occurring as a result of the Marina operations is considered to be low. A loss could result in a medium-term change to the environment, and could cause indirect impacts to marine mammals, flora and fauna, as well as the Saltworks' operations. The significance of impact has therefore been predicted as being low adverse.

The proposed development site will have a drainage system which will incorporates oil interceptors and fat traps. Surface water runoff and any waste effluent will be filtered prior to discharge to the marine environment, therefore it is unlikely that significant impacts will arise.

8.6.7. Lagoon & Ramsar Site

Walvis Bay Wetland Ramsar site covers the Lagoon, Pelican point and the Saltworks. The most important features and main reasons for the designation of the area are the mudflats exposed at low tide, the various sandbars and the diverse population and significant individual number of birds.

The Bay area plays a fundamental role in maintaining the environmental conditions that support the mudflats and bird life within the Ramsar site. Changes to the characteristics and attributes of the Lagoon such as sedimentation, recharge and flow rate, water quality and chemical composition could impact the environmental conditions resulting in indirect adverse impacts to the ecological features and bird populations, and thus jeopardise the loss of the international designation and potentially impacting the local tourism industry and other ecological services.

Due to its international designation and regional economic value, the Ramsar site is a highly valued site, however it has the capacity to accommodate change as illustrated through the constantly altering environment as a result of both natural and human influences (as discussed in the baseline chapter).

Taking into consideration the potential impacts assessed and presented in sections 8.6.2 to 8.6.6, there is potential for the water quality of the Lagoon to be affected by construction works, thereby affecting the dynamics of the Ramsar Site. In summary, the key issues are as follows:

- **Water flow:** The natural flow is unlikely to change as a result of the presence of the Marina – flow velocities are expected to deviate by a maximum of 3mm/s, however the Lagoon Access Channel will be dredged, thereby the flow may improve from baseline conditions.
- **Turbidity and suspended solids:** Suspended solids may arise due to dredging activities, however with the application of the construction methodology (use of bund, operate on outgoing tides) and type of dredging technology, suspended solids are expected to be minimal during the 6 months of marine construction works and to short duration of maintenance dredging. Sedimentation can cause indirect impacts to the marine environment.
- **Toxicity:** During dredging, there is a risk of disturbing rich organic sediments in an anoxic environment, leading to sulphur eruption, leading to the water becoming toxic. These potential impacts would be temporary and localised and would not worsen the existing conditions.
- **Pollution:** It is very unlikely that existing pollution, namely heavy metals will be disturbed and spread into the Lagoon or impact the water quality.

- **Pollution:** There is potential for an increase in pollution entering the environment as a result of additional vessels and boats operating in the marine environment.

In addition to these, there is potential for to disturb birds through the temporary loss of a small area of habitat during construction; noises from construction activities and operations; changes to food sources due to increased sedimentation; and the introduction of new buildings and lights potentially resulting in injury, mortality or changes to available food.

Taking into consideration these potential impacts that may affect certain attributes of the Ramsar site, the nature of the activities and mitigation measures that will be applied, the risk of affecting the integrity and qualifying features of the Ramsar site, namely the bird populations, is expected to be low. The magnitude of change is therefore considered to be minor and the potential impact assessed to be moderate adverse, which is driven mainly by the international value of the site.

8.6.8. Summary of Impacts on Water Quality

Table 36 - Impacts on water quality

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Construction activities in the marine environment	- Water Flow, the Lagoon	Reduction of water flow into and out of the Lagoon	Adverse Direct Local Short Term Reversible	Medium	Negligible	Adverse Low (2)
Operations – permanent marine feature	- Water Flow, the Lagoon	Reduction of water flow into and out of the Lagoon	Adverse Direct Local Long Term Permanent	Medium	Negligible	Adverse Low (2)
Construction activities in the marine environment	- Water Quality: suspended sediments, the Lagoon	Flora and fauna directly affected by suspended sediments, leading to a reduction in light	Adverse Indirect Local Short Term Reversible	Medium	Minor	Adverse Minor (4)
Operations – maintenance of access channel and marina	- Water Quality: suspended sediments, the Lagoon	Flora and fauna directly affected by suspended sediments, leading to a reduction in light	Adverse Indirect Local Short Term Reversible	Medium	Negligible	Adverse Low (2)
Construction –dredging activities	- Marine flora and fauna, the Lagoon	Sulphur events leading to anoxic and toxic water quality, leading to indirect impacts on local fauna and flora	Adverse Direct and indirect Local Short-term Temporary	Medium	Minor	Adverse Minor (4)
Marina operations	- Local community	Foul smelling environment due to anoxic environment in Marina	Adverse Indirect Local Temporary Reversible	Low	Minor	Adverse Low (2)
Construction - Dredging activities	- Marine flora and fauna - Saltworks	Elevated pollution levels (heavy metals) directly impacting the water quality, and indirectly impacting flora and fauna	Direct and indirect Local Short-term Temporary	Low	Negligible	Adverse Low (2)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Operation – boat activities	– Marine flora and fauna	Elevated pollution levels directly impacting the water quality, and indirectly impacting flora and fauna	Direct and indirect Local Short-term Temporary	Medium	Negligible	Adverse Low (2)
Construction and operation	– Ramsar Site (and Lagoon)	Integrity of the Ramsar Site through reduced water quality (increase sedimentation, flow,) and indirect impact on bird populations.	Direct and indirect International Short-term Temporary	High	Minor	Adverse Moderate (6)

8.6.9. Public Feedback on the Impacts to The Lagoon and Ramsar Site

During the review process of this ESIA report in January 2018, I&APs raised their concerns regarding the Lagoon's ecosystem and potential impacts as a result of the proposed project. This section in addition to Section 4.7.4.6, provides further information on the mitigation methods for the dredging operations.

The Lagoon is the most important feature of the Ramsar site; it supports 40% of the waders that reside in the Ramsar site; and is hydrologically linked to the mudflats and Salt Pans / Evaporation Ponds. Over the last few years, the Lagoon environment has changed, which has been documented in the decline in bird numbers (Appendix H) and observed by the local community. It is therefore imperative that the proposed project does not contribute to adverse changes.

Activities in the marine environment, namely dredging and piling are the most concern as these can potentially result in direct and indirect impacts to the Lagoon. As discussed, various mitigation is embedded in the construction design and construction activities, various additional mitigation shall be applied as well as monitoring. In summary, these are:

- **Construction design:** A bund will be provided as soon as reasonably practicable to support the dredging operations and minimise suspended sediments.
- **Choice of technology:** A gravel dredge pump system which uses a sucking technique has been identified as the preferred option. A review is currently being undertaken to ensure this is the correct technology. During this review the Watermaster (Appendix N) was identified, which utilises a special technique specifically for shallow water which minimises suspending solids entering the water column.
- **Scheduling:** The time of year when dredging will be undertaken will consider the findings of this assessment. Dr. Rob Simmons recommended that dredging should be undertaken in winter months, from May to August…
- **Scheduling:** The dredging works will be scheduled so that other similar marine activities in the southern area of the Bay are not undertaken at the same time.
- **Scheduling:** Depending on the preferred technology, dredging will occur on the outgoing tide at all times, or when turbidity thresholds within the Lagoon cannot be achieved.
- **Thresholds and monitoring:** A monitoring plan shall be developed, setting out turbidity thresholds (see below) and monitoring arrangements for turbidity and heavy metal before, during and after dredging activities.
- **Thresholds and monitoring:** If thresholds are exceeded, a silt curtain shall be deployed.
- **Dredged material:** All material dredged during construction shall be relocated at on-shore sites approved by the Namibian authorities and according to the conditions stipulated in the approvals for sites.

The aim of the pre-construction monitoring plan, as set out in the Construction ESMP (Appendix A) is to:

- Further develop the baseline records of existing turbidity conditions in the Lagoon;
- Set out turbidity and heavy metal monitoring arrangements;
- Set out turbidity thresholds; and
- Including a measure to determine organic matter vs. suspended solids.

Threshold values for suspended sediments concentrations will be applied during the dredging monitoring programme to ensure that the potential impacts to the Lagoon are mitigated. The threshold values have been determined using the environmental thresholds of bivalve molluscs and fish, and combine biological effects data and values based on a background, reference signal (Gosling, 2003) (Namport, 2006). This approach sets response parameters of background suspended sediment concentrations exceed the threshold limit. The Australian New Zealand Environmental and Conservation Council (useful guide to marine water quality) recommends that the 80th percentile of at least 10 observations of background values should constitute the new guideline value for the lowest limit (Delta Marine Consultants, 2010).

Suspended sediment concentrations for the upper portion of the water column will therefore be measured as Total Suspended Solids (TSS) in units of mg/l. By adopting this approach, the following environmental thresholds for turbidity levels have been adopted which is consistent with Namport's thresholds (Delta Marine Consultants, 2010):

- < 20 mg/l or 80th percentile of background levels – desirable low risk scenario.
- 20 – 80 mg/l for continuous periods of three days or longer - lower threshold of possible adverse ecological effects.
- 80 – 100 mg/l for more than six hours - probable adverse effects, mitigation measures must be considered.
- 150 mg/l - proven negative impacts, cease dredge operations.

Monitoring locations will be suitability placed in the Lagoon area to detect potential impacts associated with dredging activities, for example a monitoring location in the centre of the Lagoon below the dredging activity would confirm the effectiveness of dredging mitigation measures (i.e. to ensure that suspended solids from dredging activities are settling out in the Bay area on the outgoing tide). Should monitoring indicate that the impacts of dredging are being mitigated successfully and if no impacts are detected due to the dredging measures employed, the option to allowing dredging into the construction bund on both the incoming and outgoing tide could be investigated given the fact that material will be pumped into a construction bund.

Samples to detect heavy metal concentrations in sediments will be collected before and after dredging. Samples collected before dredging will be compared to the historic sediment samples and heavy metal results for the Lagoon area, thereby providing a more robust baseline (COWI, 2003 a, BCLME). Sediment samples collected after dredging will be used to compare results and check the effectiveness of mitigation measures.

Pers comms with Mr Rodney Braby (currently at the BCME and previously nine years at NACOMA (the Namibian Coast Conservation Management Project)) on the 13th February 2018 confirmed that independent threshold effect limits (e.g for sediment or water quality) specific for the Lagoon are not in place as the Lagoon is dependent on the waterbody of the wider Bay area; therefore the threshold effects limits that are applied to the Bay area are used for the Lagoon and the proponent should comply to these threshold limits as set out above.

8.7 The Marine Environment: Avian

Impacts on the birds has been assessed and reported in this section. Significant impacts or impacts that have specific interest to the community and stakeholders are summarised in Figure 64 . An Avian Assessment was undertaken by the specialist Birds and Bats, which is presented in Appendix H.

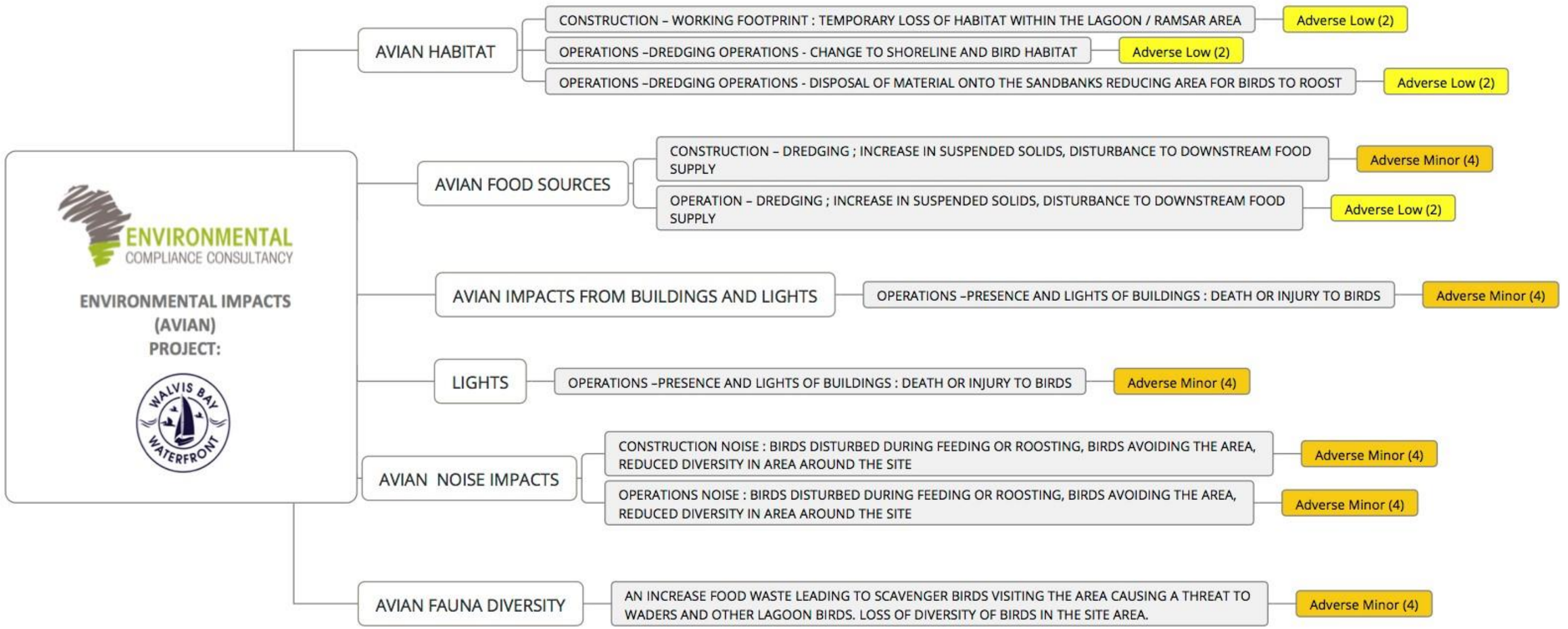


Figure 64 – Avian Impacts

8.7.1. The Lagoon and Ramsar Site

As discussed in Section 8.6.1, the Lagoon and Bay area provides a sanctuary for a number important and listed bird species. The Lagoon and surrounding area form the Walvis Bay Wetland Ramsar site, which is designated primarily for the bird life. The impacts on the Ramsar characteristics that make the unique wetland area, in particular, the water quality, have been assessed in Section 8.6.7. The conclusion was that there is potential for moderate adverse impacts to occur on the Ramsar site during the construction as a result of the changes to sedimentation, recharge and flow rate, and chemical composition, which would have an indirect impact on birds, the qualifying Ramsar feature. Whilst the main assessment for the Ramsar site was discussed earlier, the indirect impacts that could impacts the bird life and thus jeopardies the integrity of Ramsar site, are discussed in this section.

As a result of the diverse populations of birds being the primary interest of the wetland, the principal reason for the Ramsar designation and also the fact that they attract considerable number of tourists to the area, the sensitivity of birds is considered to be medium; they are of regional value but have the capacity to accommodate change.

8.7.2. Avian Monitoring Program

Twice-year (summer and winter) bird counts have been undertaken for the last 30 years, led by Mr. Peter Bridgeford, an international avian specialist in conjunction with a number of NGOs, interested groups, private businesses, Walvis Bay Municipality, environmental organisations and the MET. The Avian Study (Appendix H) was prepared by Dr. Rob Simmons, a specialised ornithologist. Dr. Simmons reviewed and analysed the bird count data and provided the findings of his review which included the potential influences on the bird populations in the Bay area.

Mr. Bridgeford continues to undertake twice-year bird counts, which is publicly available and shall be shared with ECC and the Walvis Bay Municipality. Appendix H recommends that further studies and monitoring is required. This is not because there is a lack of data for assessment purposes, but because the trends in the avian community should be continually monitored so that they can be more understood, which can be used to understand what impacts the numbers and diversity, e.g. natural processes or anthropogenic influences.

As set out in the ESMPs, the proposed project's Environmental Management team shall be encouraged to participate in the bird counts. This data shall be used for various reasons, in particular to monitor bird populations and diversity, and identify impacts that are affecting the bird life and suitable mitigation measures to minimise effects.

8.7.3. Avian Habitat: Construction

There are four main waterbird habitats within the Walvis Bay wetland complex: the sandy shoreline (including the Peninsula), intertidal mudflats, shallow sheltered water, and constructed saltpans. The most important feature of the area is the mudflats which are exposed at low tide, providing several sandbars serving as roosting sites for a diverse range of wetland birds.

The proposed project will occupy a small part of the north-east corner of the Ramsar site; approximately 0.014% (0.54 hectares). During construction, the sandy shore of the coastline within the proposed project site footprint will be temporarily unavailable for use by birds, and the surrounding coastline may also be affected due to other nuisances such as noise and general construction activities.

The temporary loss of the small area of habitat for birds will be limited to the marina construction period (6-8 months). The loss of this area will only affect a few individuals and not populations. This short-term adverse impact is considered to be indirect and will have a negligible magnitude of change. This area is not considered an important area for feeding or roosting compared to the inner Lagoon area, nor has anything unique been identified in this area in relation to bird habitat. The impact is considered therefore considered to be low.

8.7.4. AVIAN HABITAT: OPERATION

The proposed project will result in additional land being created within the Lagoon and Ramsar site (approximately 0.30 additional hectares), which will result in 0.84 hectares of the Ramsar site being occupied by the proposed project. This altered habitat could be used by for birds, mainly for roosting; however, it would not provide a significant change to the overall availability of suitable areas/habitats for roosting or feeding. This long term permanent change is therefore considered to have a low impact.

During operations, maintenance dredging of the Access Channel and Outer Marina will be required, approximately every two and five years, respectively. If the material is of suitable quality, the material may be disposed of in the marine environment (see Section 5.6). The identified areas are not a bird breeding or feeding area, however the sandbank area is where birds are known to roost. If moved to the sandbanks, there is potential to disturb birds roosting in the area. The change would be for a short temporary duration, and the impacts would be felt by individuals and not populations, who have other areas to roost. The magnitude of change of disposing material in the marine environment, and for example on the sandbanks is therefore considered to be negligible and overall impact considered to be adverse low.

8.7.5. AVIAN FOOD SOURCES: CONSTRUCTION

Section 8.6.4 details the findings of the water quality assessment and suspended solids. Suspended solids will arise from construction activities which could result in smothering habitats downstream on incoming tides. An increase in sediments may decrease feeding opportunities, decreasing the likelihood that wading birds will use the area(see section 8.1.1.39). If food source of birds is affected, birds may find alternative locations to feed away from the Bay area, thereby altering the special characteristics and ecology of the Ramsar site and Lagoon area.

Avian declines of 42% in the Lagoon have been recorded over the past 20 years which has had an average rate of decline of approximately 2.1% per year, which can be seen in 11 of the 14 waders using the Lagoon. This decline worsened during and after the Namport Container Expansion project for four years at approximately 8.4% per year (see Section 6.1.2.15). This decline does not prove that the project causes the decline, however the two could be linked. It can therefore be assumed that sedimentation, salination, pollution and/or disturbance from the Namport construction works are key impacts causing effects. As per Section 8.1.1.39, An environmental dredger or gravel dredge pump system and vibratory piling techniques will be applied during construction and various mitigation measures will be adopted including the use of a bund, the overseeing by Mr Alan Louw, the scheduling and sequencing of works will consider local sensitive receptors (e.g. preference is to undertake works in the winter months) and turbidity monitoring will be undertaken throughout construction works. Further detail o mitigation measures are detailed in the ESMPs (Appendix A).

The potential impact from dredging (construction and operational) and thus increase suspended solids, on downstream food supplies of birds will be localised and short-term in nature. Birds will be able to utilise alternative food supplies; however, this could risk temporarily moving to a different area. The magnitude of change is considered minor due to the dynamic nature of the Lagoon and past experiences or exposure in relation to dredging, therefore the overall significance is considered minor and unlikely.

8.7.6. AVIAN FOOD SOURCES: OPERATION

Dredging will be required during operations to maintain safe nautical passage of the Access Channel and the Outer Marina. This will occur every two and five years respectively. These operations will be infrequent, of a short duration and result in localised suspended solids (as discussed in Section 8.1.1.40). The potential impact would be low adverse, potentially impacting fish populations (see section 8.1.1.39) and indirectly food sources for birds. Birds may be impacted; however, this is considered unlikely due to the nature of effects, would be able to avoid the localised area during these periods and find food sources elsewhere in the Lagoon or Bay area.

8.7.7. Avian Impacts from Buildings and Lights: Operations

The proposed project will incorporate new buildings into the landscape and seascape of the local area. This new infrastructure should not impact the flight paths or movement of birds during the day, however at night, when buildings have lights on, there is potential for birds to collide with the buildings, thus resulting in mortality or injury.

The heights of the buildings have been designed taking into consideration advise from Dr. Rob Simmons, who confirmed that bird flight paths can be adjusted to avoid collisions, therefore a seven-story building should not result in impacting bird flight paths. There are no other tall structures adjacent to the area, therefore ample room for birds to fly around the buildings. However, at night some of the buildings will be lit, which could disorientate or distract birds. A second impact of lights is the potential attraction of bugs, leading to birds feeding off them and subsequently colliding with buildings.

Lights will be minimised where possible, downward facing lights shall be sued where appropriate and sensor lights in office and communal areas that will go off when the space is not in use. However, even with these mitigation measures there will be a noticeable change in nighttime lighting in the area, particularly for birds. Tall masts or buildings with bright lights attract and kill more birds than any other anthropogenic source, excluding domestic cats (Loss et al 2014). Therefore, there is potential for the lights from proposed project to affect night-flying birds and migrants.

Birds will become accustomed to the change in landscape during daytime hours, and would only be impacted for a very short time. However, there is potential for the presence and lighting of the buildings to result in long-term changes. The design team and the ESIA team have incorporated recommendations from Dr. Rob Simmons into the lighting plans and strategy for the development to reduce potential impacts to birds from the proposed project. The adverse impact of lights is considered to be long-term and irreversible. The magnitude of change from the baseline environment is considered minor due to the presence of existing tall lighting structures on the project site and surrounding Namport area. The overall impact is therefore assessed to be minor adverse.

8.7.8. Avian Noise Impacts: Construction

During construction, various plant and equipment will increase noise levels in the local vicinity of the proposed project site and marine environment. Sudden noise can cause birds that are feeding to take flight, reducing energy intake and relocate to less productive areas away from sources of noise.

The main construction activities have been planned to avoid the summer months when the long-distance migrants are present. Furthermore, noisy activities have been designed out where possible; blasting will not be undertaken, and the vibratory pile driving will be employed.

Whilst some birds may feed along the coastline close to the proposed project site, the main feeding areas are further in the Lagoon, therefore only a few individuals would be affected by potentially noisy construction activities. Birds would most likely avoid the area for the duration of the construction works and find alternative feeding grounds in the Lagoon and Bay area. The change would be short-term and therefore the magnitude is considered to be minor. The overall impact is considered to be adverse minor.

8.7.9. Avian Noise Impacts: Operations

The proposed project may result in an increase in noise both on-shore and off-shore during operations: increase in watercraft traffic in and out of marina; increased road traffic around the development; and an increase in people and associated activities. This increase in noise levels, particularly in the marine area may dissuade sensitive species of birds from roosting or feeding in the local area, thereby reducing the diversity of birds around the proposed project site.

Strict controls over the users of the marina will include one point of entry and exit from the Lagoon and limitations to where motorized boats are permitted in Lagoon and Bay area. The magnitude of this potential change is considered adverse minor; the change to the existing baseline is expected to be small and infrequent, however will be a permanent change to the local area. The marine area around the proposed project site is not a unique feeding area and other area are available within the Lagoon. The receptor has a medium sensitivity resulting in an overall minor impact.

8.7.10. Avian Fauna Diversity: Operations

The proposed project will accommodate restaurants and other catering facilities. From the operation of these facilities, scrap food will be produced, which would increase the potential for scavenger birds to visit the area. An increasing number of scavenger birds can dissuade other species of birds, resulting in a decrease of waders and other wetland birds in and around the area of the proposed project.

A dedicated waste disposal area will be within the proposed project, which will have dedicated enclosed sorting facilities. Operations across the development and dedicated staff will maintain areas and collect waste to reduce attracting scavenger birds. There will however still be potential for this impact to occur, however, through good housekeeping measures, it will be reduced as much as possible. The adverse impact could be long-term and have a minor magnitude of change, thereby resulting in a minor adverse impact.

8.7.11. Summary of Impacts on Marine Birds

Table 37 - Impacts on Avian Fauna

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Construction – working footprint	– Avian Fauna, roosting / feeding ground	Temporary loss of habitat within the Lagoon / Ramsar area	Adverse Direct Local Short Term Reversible	Medium	Negligible	Adverse Low (2)
Operations – dredging operations	– Avian Fauna, roosting / feeding ground	Change to shoreline and bird habitat	Adverse Direct Local Permanent Irreversible	Medium	Negligible	Adverse Low (2)
Operations – dredging operations	– Avian Fauna, roosting / feeding ground	Disposal of material onto the sandbanks reducing area for birds to roost	Adverse Direct Infrequent Local Short Term Reversible	Medium	Negligible	Adverse Low (2)
Construction – dredging	– Avian Fauna, food sources	Increase in suspended solids, disturbance to downstream food supply	Adverse Indirect Local Short Term Reversible	Medium	Minor	Adverse Minor (4)
Operation – dredging	– Avian Fauna, food sources	Increase in suspended solids, disturbance to downstream food supply	Adverse Indirect Local Infrequent Short Term Reversible	Medium	Minor	Adverse Low (2)
Operations – presence and lights of	– Avian Fauna	Death or injury to birds	Adverse Direct Local	Medium	Minor	Adverse Minor (4)

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
buildings			Long Term Irreversible			
Construction–noise	– Avian Fauna	Birds disturbed during feeding or roosting, birds avoiding the area, reduced diversity in area around the site	Adverse Direct Local Long Term Partly Reversible	Medium	Minor	Adverse Minor (4)
Operation - noise	– Avian Fauna	Birds disturbed during feeding or roosting, birds avoiding the area, reduced diversity in area around the site	Adverse Direct Local Long Term Partly Reversible	Medium	Minor	Adverse Minor (4)
Waterfront operations	– Avian Fauna	An increase food waste leading to scavenger birds visiting the area causing a threat to waders and other Lagoon birds. Loss of diversity of birds in the site area.	Adverse Direct Local Long Term Reversible	Medium	Minor	Adverse Minor (4)

8.8 THE MARINE ENVIRONMENT: MARINE MAMMALS

The marine environment in the Bay area provides a home for or is frequented by a range of marine mammals including seals, whales and dolphins. The significant hydrodynamics and water quality impacts or impacts that have specific interest to the community and stakeholders are summarised in Figure 65.

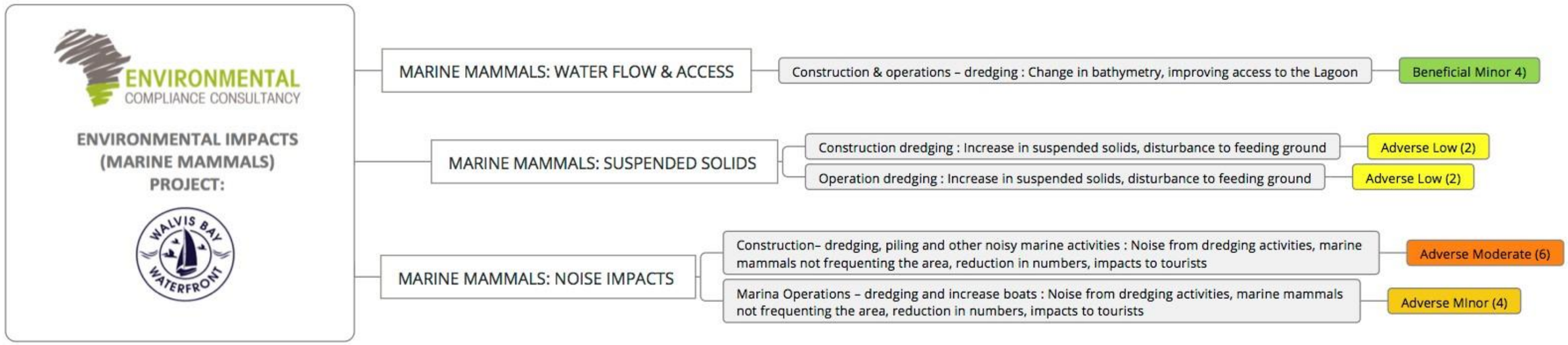


Figure 65 – Significant Marine Impacts

8.8.1. MARINE MAMMALS

Impacts on marine mammals associated with the proposed project include access to the Lagoon, underwater noise impacts, reduced prey availability, disturbances from construction and shipping activities, contamination of the water column and resultant bioaccumulation of toxins, injury from litter, stress from increased human activity and habituation to human presence.

Through consultation with the Namibian Dolphin Project and Dr. Amanda J. Rau, a marine specialist (Marine Mammals Study is found in Appendix J), it has been identified that the cetacean species most likely to be impacted by construction activities of this project is the common bottlenose dolphin (Tursiops truncatus). A large proportion of the population of bottlenose dolphins that inhabit the Bay area use the shallow waters of the Lagoon for feeding, socialising and resting on a regular basis. Whales do not tend to enter the bay and it is predicted that seals will not be significantly affected by the proposed project. Therefore, bottlenose dolphins have been used to undertake the assessment of impacts on marine mammals as they represent the worst case.

Given the small size of the population of Bottlenose dolphins in the Bay area, any deaths or injuries to individuals could potentially have implications for the local population. Bottlenose dolphins are not threatened internationally and are not internationally protected. Due to their local importance and attraction for tourists, Bottlenose dolphins are considered as medium value and sensitivity, and are sensitive to change with limited substitution in the region.

8.8.2. MARINE MAMMALS: WATER FLOW & ACCESS

As discussed previously, the natural Lagoon eastern channel will be dredged in order to allow a safe nautical passage for boats in and out of the marina. This natural channel is used by dolphins and fish entering and exiting the Lagoon, who are of value to the area for the tourism industry. Whilst the dredging of this access channel during construction and operation will result in negative impacts through suspended sediments (see section 8.8.3), long-term benefits may also be achieved: access to the Lagoon by marine species may become easier as a result in the change in bathymetry, and the flow of water through the channel may increase, thereby improving the biodiversity and number of individuals visiting the Lagoon. It could however potentially increase the risk of larger numbers of dolphins becoming stranded at low tide. Taking into consideration the benefits and negatives, this change could result in an indirect long-term and localised beneficial impact, and therefore is considered to be a minor magnitude of change. The significance of the impact is predicted to be minor beneficial.

8.8.3. MARINE MAMMALS: SUSPENDED SOLIDS DURING CONSTRUCTION

Section 8.1.1.39 details the activities that would lead to solids becoming suspended and the potential direct impacts. Whilst suspended solids will not directly adversely affect marine mammals as they are able to navigate through turbid waters, prey fish (food source of mammals such as dolphins) may be affected through abundance and distribution within the Lagoon and Bay area. The potential impact of a dredge plume will be localised and short-term. Marine mammals can compensate through relocation to an alternative feeding ground or switching prey species. The magnitude of change on marine mammals is therefore considered to be negligible and overall impact assessed to be adverse low.

A potential secondary impact could arise through loss of dolphin sightings in the Lagoon area, however this will be for a short-duration (weeks) and specific to construction activities that would result in suspended solids (piling and dredging). Therefore, the impact to tourists would be negligible and not discussed further.

8.8.4. MARINE MAMMALS: SUSPENDED SOLIDS DURING OPERATION

Dredging activities will occur every two years and will be of a short duration. During these activities, dolphins will avoid the area, but will not be permanently affected and are expected to return once the activities are complete. Activities during operations are unlikely to cause a significant impact on dolphins.

8.8.5. MARINE MAMMALS: NOISE IMPACTS DURING CONSTRUCTION

Construction activities in the marine environment will result in underwater noise that can affect marine mammals. The key noisy activities are:

- The construction of the marina wall including stone dumping and piling;
- The dredging of the natural Lagoon channel and the Marina Access Channel; and
- The dredging of the outer marina.

Dr. Simon Elwen of The Namibian Dolphin Project has observed through monitoring of the recent construction projects in Walvis Bay, that Dolphins tend to avoid noisy activities rather than being attracted to them. The Marine Mammal Study (see Appendix J) also confirms these observations: evidence shows that dolphins can avoid noisy marine activities by up to distances of 20km and will remain distant from the noise sources for 4 to 48 hours. Behavioural changes may also occur, such as non-directional movement to directional movements, however behaviour returns to baseline levels within 4 hours of noisy activities.

Large amounts of noise produced at the mouth of the Lagoon, may act to chase animals further into, or trap them in the Lagoon, potentially resulting in them stranding on a dropping tide (pers. comm Dr. Simon Elwen NDP 2017).

The construction noise associated with stone dropping, pile driving and dredging will be of a limited duration. The pile driving activities will last for approximately two weeks, the dredging of the access channel will take approximately three months. The whole marina will be completed in approximately six months. The construction sequencing and construction methods have been designed to avoid and minimise underwater noise. Noisy activities will occur simultaneously (i.e. dredging and pile driving) to reduce the duration and occurrence of noise. The use of the vibratory piling driving method for the marina construction will significantly reduce the time and exposure of increased noise to the marine environment; furthermore, the amplitude of sound produced is significantly reduced.

Increased levels of anthropogenic noise can cause marine mammals to avoid areas they would normally inhabit, sometimes permanently. Additional noise provokes changes in diving and foraging behaviour, leading to greater energy expenditure and potential loss of feeding opportunities, and may limit communication and the detection of biologically important sound sources.

Monitoring of the animal movements before construction commences, during and after construction will ensure that the activities are timed in such a manner to avoid impacting marine animals. The proposed project will engage the Namibian Dolphin Project to conduct Hydrophone monitoring prior to and during construction activities to determine the dolphin movements and impacts on dolphins as a result of the project. Furthermore, an independent Marine Mammal Observer (MMO) from the Namibian Dolphin Project will be appointed to observe and identify if animals are present before and during works. The MMO will have the authority to stop construction activities if dolphins are within the predetermined safe zone.

Mr. Alan Louw (a local specialist in marine dredging activities) will also be engaged to oversee dredging activities to ensure sedimentation in the water column is limited. This activity will be managed according to feedback from both experts and will be dependent on animal behaviour for example monitoring may indicate that dredging rates could increase to reduce noise exposure or dredging rates might have to decrease due to siltation.

Noisy activities are not expected to present any long-term adverse impacts to any of the mammals in the Bay area. Short-term impacts may include avoidance behaviour and reduction in prey species that could move away. However, the varied diet of seals and cetaceans, and their ability to forage some distance away from their usual habitats will negate any temporary reduction in prey availability. This impact would be temporary and short-term and would not cause any feeding stress. The magnitude of change is considered to be moderate thereby resulting in an adverse moderate significant impact.

In addition to the mitigation measures discussed above, the following mitigation measures are to be considered as recommended by the mammal study (Appendix J):

- No piling during the seasons with the highest abundance of sensitive species (June and September);
- Using "soft starts" and ramping-up procedures to allow mammals to move away;
- Monitoring noise levels. If they exceed 30 kPa at a distance of 1m to 2m from the pilings noise reduction methods should be considered such as mantling or installing silt or bubble curtains; and
- Establishing specified safe distance zones (500 m for Cape Fur Seals and 2 km for dolphins) and delaying or ceasing piling operations if a mammal is within these zones.

8.8.6. Marine Mammals: Noise Impacts during Operation

During operations, dredging of the marina access channel and outer marina will be required approximately every two and five years respectively. The number of boats in the marine environment is also likely to increase, however this will be limited to the number of mooring spots in the marina (70). Potential underwater noise during the operations is expected to increase from the current baseline, however only by a small amount and for intermittent durations in localised areas; the magnitude of change is expected to be minor. It is unlikely that marine mammals will completely avoid the Lagoon and Bay area as a result of these changes. The potential impact to marine mammals is therefore predicted to be minor adverse.

8.8.7. Marine Mammals: Toxicity & Pollution

As discussed in section 8.6.6, there is unlikely potential for toxins, including heavy metals and organic compounds to be resuspended into the water column during dredging and piling activities in the construction phase and through maintenance dredging. Marine mammals accumulate high levels of contaminants, irrespective of whether they are exposed to construction or dredging activities, as they are highly mobile creatures feeding at high trophic levels and have a large proportion of lipid-rich blubber which readily accumulates toxins. Pollution can impact the health of individual marine mammals and have longer-lasting, population-level impacts such as reproductive complications, developmental defects, strandings and other mortality events.

It is anticipated that marine mammals will avoid the area during the piling and dredging operations due to the noise, vibration and affected feeding grounds through suspended sediments. However, when they return, they may feed off prey fish which have been exposed to toxins. It is not expected that the levels of toxins will be present in the Lagoon area; as stated in section 6.23.7 metals in sediments are found in the Harbour and Bay area, however not in the Lagoon. Therefore, potential issues with the dredged material and toxicity levels are considered to have negligible magnitude of change and the overall significance is predicted to be low adverse.

8.8.8. Marine Mammals: Human-Mammal Interactions

During the construction and operation of the proposed project, there will be an increase in marine traffic, in particular during the operational phase. The Port of Walvis Bay is Namibia's largest harbour and accommodates a range of vessels, both within the Harbour and moored off-shore. Large sea-going vessels entering and exiting the Port of Walvis Bay do so under pilotage and follow the designated channel at low speed. Consequently, cetaceans become habituated to this pattern and will likely avoid ships. Smaller craft do not need to use the dredged approach channel and behave more randomly. They are thus more likely to have encounters with marine mammals. An increase in the number of small craft can consequently raise the risk of mammal strikes. Dolphins are usually easily able to avoid vessels and generally can co-exist comfortably with both ships and smaller craft. Nevertheless, careless and reckless handling of high-speed craft in the presence of dolphins could result in injury through propeller strikes (Appendix J).

The current numbers of small crafts and the addition of the boats that would use the Marina are considered not to cause major distress to the resident dolphin population and marine mammals in the Bay area. However, there is still a risk of cetaceans being disturbed or injured.

Marine mammals become habituated to vessel movement, therefore the Marina Access Channel shall be clearly demarcated for the entry and exits of boats, allowing mammals to be accustomed to the route. Speed limits will be set and enforced, and a Code of Conduct shall be drawn up and be circulated regularly and strictly enforced. Notice boards around the Marina will display the Code of Conduct as well as rules to abide by for example, no littering and no feeding of wild animals.

The potential impacts to marine mammals will be adverse and localised. They will occur throughout the operational phase, and therefore are considered to be long term. The magnitude of change is considered to be minor, and therefore the overall impact is considered to be of minor significance.

8.8.9. Summary of Impacts on Marine Mammals

Table 38 - Impacts on Marine Mammals

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Construction & operations – dredging	– Marine mammals	Change in bathymetry, improving access to the Lagoon	Beneficial Direct Local Long-term Irreversible	Medium	Minor	Beneficial Minor (4)
Construction– dredging	– Marine Mammals – Prey Fish	Increase in suspended solids, disturbance to feeding ground	Adverse Indirect Local Short Term Reversible	Medium	Negligible	Adverse Low (2)
Operation - dredging	– Marine Mammals – Prey Fish	Increase in suspended solids, disturbance to feeding ground	Adverse Direct Local Temporary Reversible	Medium	Moderate	Adverse Low (2)
Construction– dredging, piling and other noisy marine activities	– Marine Mammals	Noise from dredging activities, marine mammals not frequenting the area, reduction in numbers, impacts to tourists	Adverse Indirect Local Short Term Reversible	Medium	Moderate	Adverse Moderate (6)
Marina Operations – dredging and increase boats	– Marine Mammals – Prey Fish	Noise from dredging activities, marine mammals not frequenting the area, reduction in numbers, impacts to tourists	Adverse Indirect Local Medium term / intermittent Reversible	Medium	Minor	Adverse Minor (4)
Construction and Operations – marine traffic	– Marine Mammals	Direct interactions with humans, increased noise, risk of injury, disturbance	Adverse Indirect and direct Local Long term Reversible	Medium	Minor	Adverse Minor (4)

8.9 CUMULATIVE IMPACT ASSESSMENT

This section presents the CIA, which has been undertaken in line with the methodology summarised in 7.5.2. A rapid CIA has been undertaken, and therefore the assessment is a relatively high-level qualitative assessment. The CIA covers the following:

- **Intra-project cumulative impacts:** Cumulative impacts that occur within the proposed project;
- **Inter-project cumulative impacts:** Cumulative impacts that occur as a result of the proposed project in combination with other projects, which is split into two:
  - Cumulative impacts with existing projects; and
  - Cumulative impacts with future projects.

8.9.1. INTRA-PROJECT CUMULATIVE IMPACTS ASSESSMENT

The proposed project may result in a receptor or resource being affected by more than one impact arising from same activity and the impacts will act together to result in a combined effect. Whilst this type of CIA is not considered in the IFC assessment guidance, it is an internationally widely accepted method to ensure potential combined impacts of a development are understood and mitigated, which may be missed from the 'general' assessment.

An example of an intra-project cumulative impact within the proposed project is as follows:

During the construction phase, there will be noisy activities such as ground excavation which could generate dust. A site boundary fence will be erected, plant and machinery will be distributed across the site, and construction traffic will access the site via the local roads. If all of these activities were undertaken at the same time, a local resident living opposite the site would be exposed to an increase in noise levels, dust may deposit on their property, views from their house will be altered from an open green space to a construction site and severance may be caused due increased traffic obscuring their normal route to town or access to their house.

The cumulative impacts that may arise as a result of the proposed project are provided in Table 39 and Table 40. The impacts in the second column ('Impacts') are those presented in Sections 8.4 to 8.8, which includes embedded and best practice mitigation. The significance of the potential cumulative impacts (third column) has been identified using the assessment methodology presented in Chapter 7 and the Significance Matrix as well as professional judgment. These impacts include embedded and best practice mitigation that has already been identified in the assessment. Mitigation that has been identified through the assessment is listed in the last column to demonstrate the measures the project is taking to minimize the impacts as much as possible. Any additional mitigation is discussed after the tables.

Table 39 – Intra-project cumulative impacts within the proposed project – construction

RECEPTOR	IMPACTS			SIGNIFICANCE	IMPACT MANAGEMENT
Tourism Industry	**Activity & impact:** Increased traffic and general construction activities both resulting in increased noise levels and generation of dust. Increased traffic causing disruption to access or increased journey times. **Impact:** Tourists avoid existing waterfront area resulting in reduced spends and thus a reduction in the tourism industry. **MINOR ADVERSE SIGNIFICANCE**		**Activity & impact:** Dredging activities and other marine and land-based construction works causing increased localised suspended solids, dust generation, noise and increase levels of pollution, resulting in the temporary loss of marine wild life. **Impact:** Reduced number of tourists or increase in complaints resulting in reduced spends in the area and affecting the tourism industry. **MINOR ADVERSE SIGNIFICANCE**	Minor	Site boundary fence, traffic management and calming measures, scheduling of noisy construction activities, dredging on outgoing tide, type of dredging technique, dust suppression techniques
The Raft Restaurant	**Activity & impact:** Construction of the Marina (piling, dredging, construction of the marina wall) leading to increase dust, noise and vibration, visual impacts (loss of visual amenity) and temporary loss of marine wild life. **Effect:** Loss of customers and thus revenue **MAJOR ADVERSE SIGNIFICANCE**		**Activity & impact:** Construction of the Marina leading to vibrations. Potential measures to protect/strengthen the structure of the building (dependent upon review by specialist). **Effect:** Restaurant closed for a period of time, resulting in loss of revenue. **MAJOR ADVERSE SIGNIFICANCE**	Major	Visual screen, vibratory piling techniques, continual access, scheduling of activities.
Protea Hotel	**Activity & impact:** Construction of the Marina – closure of the Esplanade. **Effect:** Loss of an access route to the hotel and thus disturbance to patrons. **LOW ADVERSE SIGNIFICANCE**	**Activity & impact:** Construction activities on the proposed project site (on and off-shore). Views from the hotel on to the Lagoon impacted. **Effect:** Loss or reduced clients / patrons and reduced revenue. **LOW ADVERSE SIGNIFICANCE**	**Activity & impact:** Construction activities on the proposed project site (on and off-shore). Noise and dust generated. **Effect:** Patrons affected by nuisances resulting in complaints, loss or reduced clients and thus reduced revenue. **MINOR ADVERSE SIGNIFICANCE**	Minor	Continual access via Atlantic Street, Site boundary fence, traffic management and calming measures, scheduling of noisy construction activities, scheduling of construction activities, site drainage, suitable site drainage.

RECEPTOR	IMPACTS		SIGNIFICANCE	IMPACT MANAGEMENT
Local Businesses (B&Bs, lodges, restaurants & shops)	**Activity & impact:** Construction of the Marina – closure of the Esplanade, increased construction traffic on the local roads (reduce journey time and disruption). Loss of tourists and patrons to the area. **Effect:** Loss of revenue. **MINOR ADVERSE SIGNIFICANCE**	**Activity & impact:** General construction works on the proposed project site, increasing noise levels in the area. **Effect:** Loss of patrons, increased complaints and thus loss of revenue. **MINOR ADVERSE SIGNIFICANCE**	Minor	Scheduling of construction traffic and traffic management and calming measures. Scheduling of construction activities.

RECEPTOR	IMPACTS				SIGNIFICANCE	IMPACT MANAGEMENT
Local Residents opposite the proposed project site	**Activity & impact:** Closure of the Esplanade, resulting in traffic flows altering. **Effect:** Local residents will be disturbed from the change in traffic flows and road users will be diverted. Severance to local residents – disruption to accessing properties, in particular those along KR Thomas Street and possibly 4th Road. **MINOR ADVERSE SIGNIFICANCE**	**Activity & impact:** Increase in construction traffic and changes to the local flow. **Effect:** Increase in risk of accidents and driver stress. **LOW ADVERSE SIGNIFICANCE**	**Activity & impact:** Construction activities on site, including ground excavation leaving to dusts. **Effect:** Dusts becoming airborne and transported to neighboring properties (nuisance & health issue). **LOW ADVERSE SIGNIFICANCE**	**Activity & impact:** Construction vehicles and general construction activities on site, increasing noise levels. **Effect:** Sensitive receptors (local residents) will be disturbed. **MODERATE ADVERSE SIGNIFICANCE**	Moderate	Restricted hours, traffic management and calming measures, defined routes to and from site, road upgrades to accommodate and mitigate increased traffic levels, site boundary fence, scheduling of noisy construction activities, notice to residents prior to noisy activities, dust suppression techniques, avoid certain activities during high winds (minimise dusts), covering of material during transportation, scheduling of relocating facilities, downward lighting.
	Activity & impact: Construction traffic, increasing noise levels. **Effect:** Sensitive receptors (local residents) will be disturbed and amenity affected. **MINOR ADVERSE SIGNIFICANCE**	**Activity & impact:** General construction site and visible plant, equipment, lights and earth movements. Change of a community open space to a construction site. **Effect:** Residents views general residential amenity will be affected. **MODERATE ADVERSE SIGNIFICANCE**	**Activity & impact:** General construction site and visible plant, equipment, lights and earth movements. Change of a community open space to a construction site. **Effect:** Landscape and seascape of the local area will alter. Loss of green open space **MINOR ADVERSE SIGNIFICANCE**	**Activity & impact:** Change of a community open space with sporting facilities to a construction site. Relocation of sporting facilities. **Effect:** Temporary loss sporting facilities used by local communities, permanent loss of green space and outdoor pool. Inconvenience to existing users due to facilities relocated to a site further away. **MINOR ADVERSE SIGNIFICANCE**		

RECEPTOR	IMPACTS			SIGNIFICANCE	IMPACT MANAGEMENT
Local Residents further away from the proposed project site and along transport routes	**Activity & impact:** Closure of the Esplanade, resulting in traffic flows altering. **Effect:** Local community will be disturbed from the change in traffic flows and road users will be diverted. **LOW ADVERSE SIGNIFICANCE**	**Activity & impact:** Increase in construction traffic along designated routes and changes to the local flow. **Effect:** Increase in risk of accidents and driver stress. **LOW ADVERSE SIGNIFICANCE**	**Activity & impact:** Increase in construction traffic along designated routes. Increased noise and potential ease of access to properties. **Effect:** Sensitive receptors (local residents) will be disturbed due to increase in noise. Community severance due to increase traffic and access to private properties. **MODERATE ADVERSE SIGNIFICANCE**	Moderate	Restricted hours, traffic management and calming measures, defined routes to and from site, road upgrades to accommodate and mitigate increased traffic levels, site boundary fence, scheduling of noisy construction activities, notice to residents prior to noisy activities, dust suppression techniques, avoid certain activities during high winds (minimise dusts), covering of material during transportation, scheduling of relocating facilities, downward lighting.
	Activity & impact: Traffic diversions or increased journeys as a result of construction of road upgrades. **Effect:** Increase community severance, journey times and potential stress. **LOW ADVERSE SIGNIFICANCE**	**Activity & impact:** General construction site and visible plant, equipment, lights and earth movements. Change of a community open space to a construction site. **Effect:** Landscape and seascape of the local area will alter. Loss of green open space **MINOR ADVERSE SIGNIFICANCE**	**Activity & impact:** Change of a community open space with sporting facilities to a construction site. Relocation of sporting facilities. **Effect:** Temporary loss sporting facilities used by local communities, permanent loss of green space and outdoor pool. Inconvenience to existing users due to facilities relocated to a site further away. **MINOR ADVERSE SIGNIFICANCE**		

RECEPTOR	IMPACTS		SIGNIFICANCE	IMPACT MANAGEMENT
Water Quality	**Activity & impact:** Dredging and piling construction activities, leading to suspended solids in the water column. **Effect:** Increased turbidity. Affect filter feeding organisms, fish (fatalities and disturbance), indirect impacts to marine mammals and birds. Reduction in light affecting seaweeds and plans. Settlement of sediments smothering plants. **MINOR ADVERSE SIGNIFICANCE**	**Activity & impact:** Dredging and piling construction activities, disturbing sediments and trapped gasses leading to a sulphur eruption. **Effect:** Reduced dissolved oxygen reducing water quality, resulting in mortality of the local marine community, indirectly impacting local birds. **MINOR ADVERSE SIGNIFICANCE**	Minor	Most appropriate dredger (sucking system) and piling (vibratory), removal of dredged material from marine environment, undertaking activities on outgoing tide, turbidity monitoring, use of a bund, silt curtain, sequencing and scheduling, well maintained and serviced equipment, all dredging over seen by suitable qualified person.

RECEPTOR	IMPACTS				SIGNIFICANCE	IMPACT MANAGEMENT
Walvis Bay Ramsar Site	**Activity & impact:** Dredging and piling construction activities, leading to suspended solids in the water column. **Effect:** Increased turbidity. Affect filter feeding organisms, fish (fatalities and disturbance – move away from area), indirect impacts to the birds (reducing their food). Reduction in light affecting seaweeds and plans. Settlement of sediments smothering plants. **MINOR ADVERSE SIGNIFICANCE**	**Activity & impact:** Dredging and piling construction activities, disturbing sediments and trapped gasses leading to a sulphur eruption. **Effect:** Reduced dissolved oxygen reducing water quality, resulting in mortality of the local marine community, indirectly impacting local birds. **MINOR ADVERSE SIGNIFICANCE**	**Activity & impact:** Construction activities in the Ramsar site and temporary land take (occupies 0.014%) **Effect:** Temporary loss of habitat and changes to the shoreline, birds affected **LOW ADVERSE SIGNIFICANCE**	**Activity & impact:** Construction noise **Effect:** Disturbance to birds and marine mammals. Avoidance of the area. **MINOR ADVERSE SIGNIFICANCE**	Moderate	Most appropriate dredger (sucking system) and piling (vibratory), removal of dredged material from marine environment, undertaking activities on outgoing tide, turbidity monitoring, use of a bund, silt curtain, sequencing and scheduling, soft starts or equipment in marine environment, well maintained and serviced equipment, all dredging over seen by suitable qualified person, continual twice-yearly bird monitoring.

RECEPTOR	IMPACTS				SIGNIFICANCE	IMPACT MANAGEMENT
Marine Birds	**Activity & impact:** Dredging and piling construction activities, leading to suspended solids in the water column. **Effect:** Increased turbidity. Affect filter feeding organisms, fish (fatalities and disturbance – move away from area), indirect impacts to the birds (reducing their food). **MINOR ADVERSE SIGNIFICANCE**	**Activity & impact:** Dredging and piling construction activities, disturbing sediments and trapped gasses leading to a sulphur eruption. **Effect:** Reduced dissolved oxygen reducing water quality, resulting in mortality of the local marine community, indirectly impacting local birds. **MINOR ADVERSE SIGNIFICANCE**	**Activity & impact:** Construction activities in the Lagoon area **Effect:** Temporary loss of habitat (roosting area) and changes to the shoreline, birds affected **LOW ADVERSE SIGNIFICANCE**	**Activity & impact:** Construction noise **Effect:** Disturbance to birds and marine mammals. Avoidance of the area. **MINOR ADVERSE SIGNIFICANCE**	Minor	Most appropriate dredger (sucking system) and piling (vibratory), removal of dredged material from marine environment, undertaking activities on outgoing tide, turbidity monitoring, use of a bund, silt curtain, sequencing and scheduling, soft starts or equipment in marine environment well maintained and serviced equipment, all dredging over seen by suitable qualified person, continual twice-yearly bird monitoring.

RECEPTOR	IMPACTS			SIGNIFICANCE	IMPACT MANAGEMENT
Marine Mammals	**Activity & impact:** Dredging and piling construction activities, leading to suspended solids in the water column. **Effect:** Prey fish (food source) may avoid area reducing food availability for marine mammals. **LOW ADVERSE SIGNIFICANCE**	**Activity & impact:** Construction or the Marina – noisy activities **Effect:** Marine mammals could avoid area due to increased marine noise. Changes to diving and foraging behavior, loss of feeding opportunities. **MODERATE ADVERSE SIGNIFICANCE**	**Activity & impact:** Increase in marine traffic. **Effect:** Human – mammal interaction leading to disturbance and potential mammal strikes from small crafts. **MINOR ADVERSE SIGNIFICANCE**	Moderate	Most appropriate dredger (sucking system) and piling (vibratory), removal of dredged material from marine environment, undertaking activities on outgoing tide, turbidity monitoring, use of a bund, silt curtain, sequencing and scheduling, soft starts or equipment in marine environment, well maintained and serviced equipment, all dredging over seen by suitable qualified person, continual monitoring before, during and after construction.

Table 40 – Intra-project cumulative impacts within the proposed project – operation

RECEPTOR	IMPACTS				POTENTIAL CUMULATIVE IMPACT	IMPACT MANAGEMENT
Local Residents surrounding the proposed project site and local community	**Activity & impact:** Closure of the Esplanade and new Waterfront Drive **Impact:** Change of flow patterns and potential severance to local residents. **LOW ADVERSE SIGNIFICANCE**	**Activity & impact:** Increased traffic movements **Impact:** Severance to local residents, increase driver stress, accidents and journey times. **MODERATE ADVERSE SIGNIFICANCE**	**Activity & impact:** Relocation of sporting facilities **Impact:** Facilities moved further away, increased travel times and access. **LOW ADVERSE SIGNIFICANCE**	**Activity & impact:** Increase background noise from proposed project site **Impact:** Local resident's amenity affected. **MODERATE ADVERSE SIGNIFICANCE**	Moderate	Traffic calming measures and road upgrades, design of the development, soft landscaping, new sewerage services, new and upgraded facilities,
	Activity & impact: Increase background noise from increased traffic **Impact:** Local resident's amenity affected. **MODERATE ADVERSE SIGNIFICANCE**	**Activity & impact:** New structures in a residential / industrial and coastline area **Impact:** Local resident's sense of place will alter. **MODERATE ADVERSE SIGNIFICANCE**	**Activity & impact:** New structures in a residential / industrial and coastline area **Impact:** Local resident's amenity affected (views and lighting) **MODERATE ADVERSE SIGNIFICANCE**	**Activity & impact:** New structures in a residential / industrial and coastline area **Impact:** Changes to the local landscape and seascape character **MODERATE ADVERSE SIGNIFICANCE**		

RECEPTOR	IMPACTS		POTENTIAL CUMULATIVE IMPACT	IMPACT MANAGEMENT
Water Quality	**Activity & impact:** Maintenance dredging leading to suspended solids in the water column. **Effect:** Increased turbidity. Affect filter feeding organisms, fish (fatalities and disturbance), indirect impacts to marine mammals and birds. Reduction in light affecting seaweeds and plans. Settlement of sediments smothering plants. **LOW ADVERSE SIGNIFICANCE**	**Activity & impact:** Increased boats and marine traffic **Effect:** Pollution entering the water and affect water quality, and indirectly impacting flora and fauna **LOW ADVERSE SIGNIFICANCE**	Low	Water quality monitoring, maintenance dredging over seen by suitable qualified person, undertaken on outgoing tide, well maintained and serviced marine vessels and boats, refuelling in designated areas, appropriate drainage system across site, rules and environmental awareness displayed throughout development.

RECEPTOR	IMPACTS				POTENTIAL CUMULATIVE IMPACT	IMPACT MANAGEMENT
Marine Birds	**Activity & impact:** Maintenance dredging, leading to suspended solids in the water column. **Effect:** Increased turbidity. Affect filter feeding organisms, fish (fatalities and disturbance – move away from area), indirect impacts to the birds (reducing their food). **LOW ADVERSE SIGNIFICANCE**	**Activity & impact: I**ncreased noise levels in the marine environment and on land. **Effect:** Disruption to behaviors **MINOR ADVERSE SIGNIFICANCE**	**Activity & impact:** Integration of new buildings and lights **Effect:** Bird flight paths will be affected, light may distract or disorientate birds at night, and bugs (food) may also be attracted by the lights, causing indirect impacts to birds. **MINOR ADVERSE SIGNIFICANCE**	**Activity & impact:** Operations of the development including waste management and food scrap **Effect:** Increase scavenger birds, dissuade other species of birds **MINOR ADVERSE SIGNIFICANCE**	Minor	Continual twice yearly bird monitoring, water quality monitoring, maintenance dredging over seen by suitable qualified person, undertaken on outgoing tide, appropriate waste management system throughout development (bins and disposal area & good housekeeping), downward lighting, design of the development (height of buildings), rules and environmental awareness displayed throughout development.

RECEPTOR	IMPACTS			POTENTIAL CUMULATIVE IMPACT	IMPACT MANAGEMENT
Marine Mammals	**Activity & impact:** Dredging and piling construction activities, leading to suspended solids in the water column. **Effect:** Prey fish (food source) may avoid area reducing food availability for marine mammals. **LOW ADVERSE SIGNIFICANCE**	**Activity & impact:** Noisy activities from increased boats in marina and dredging activities **Effect:** Marine mammals could avoid area due to increased marine noise. Changes to diving and foraging behavior, loss of feeding opportunities. **MINOR ADVERSE SIGNIFICANCE**	**Activity & impact:** Increase in marine traffic and human – mammal interaction **Effect:** Disturbance and potential mammal strikes from small crafts. **MINOR ADVERSE SIGNIFICANCE**	Minor	Continual twice-yearly bird monitoring, water quality monitoring, maintenance dredging over seen by suitable qualified person, undertaken on outgoing tide, appropriate waste management system throughout development (bins and disposal area good housekeeping), downward lighting, design of the development (height of buildings), rules and environmental awareness displayed throughout development.

During construction, the Raft Restaurant is likely to have major impacts. Whilst the nature of the impacts will be for a short duration and the business will likely see long term benefits when the proposed project becomes operational, the proponent and the management of the Raft will work together to identify further mitigation impacts that would reduce the significance of impact during construction.

The local residents and community are likely to be moderately impacted as a result of the combined impacts of the proposed project. The construction phase is expected to last for 3.5 years which will be undertaken in phases. During construction, an Environmental and Social Manager will be available to consult with and direct and concerns or complaints. The Environmental and Social Manager will work with the community to manage impacts from the proposed project during both construction and operation.

The predicted significance of cumulative impacts to the Ramsar site during construction is driven by the value of the site (High) and applying a precautionary approach. The proponent is committed to avoiding impacts on this international designated site and will implement a water-monitoring programme that will support the avoidance of adverse impacts that would affect the features and attributes of the site, e.g. water quality. All construction personnel will be briefed about the environmental sensitives of the local area and protection measures prior to construction works commencing and the Environmental and Social Manager will work closely with local environmental groups such as local bird groups, Namibia Dolphin Project and MFMR.

Marine mammals may also be moderately adversely impacted due to the combined impacts arising from the construction of the proposed project; however, a cautious assessment approach has been applied; the activities that cause the most impact are of a short duration and a local small area, therefore these impacts may be less severe than assessed. The Environmental and Social Manager will work with Namibian Dolphin Project to ensure construction works are not significantly adversely impacting marine mammals, and if there is evidence of significant impacts during certain activities, works will cease and measures to minimise impacts will be implemented.

During operations, the assessment has identified that there is potential to cause moderate impacts on the local residents and community. The majority of these impacts are surrounding the changes to the local developed environment and the perception of the impact from person to person. Humans are adaptable and therefore the severity of these impacts will reduce over time as residents become accustomed to their new surroundings. Environmental monitoring will be undertaken through the construction and operational phases of the proposed project. These are included in the relevant ESMPs (Appendix A). The monitoring programme will support the identification of further mitigation if thresholds are breached.

8.9.2. Inter-Project Cumulative Impact Assessment

As defined in Section 7.5.2, IFC assessment guidance (International Finance Corporation, 2012) states that a CIA should assess impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned, or reasonably defined developments at the time the risks and impact identification process is conducted. This section assesses existing and then reasonably defined developments.

Namibia does not have a centralised database that logs all existing and future potential projects applying for an Environmental Clearance, therefore information is not easily available for people /consultants to allow them to determine or obtain all potential projects in a given area. The assessment of potential combined impacts is therefore limited to known existing and future projects through a detailed literature review.

8.9.2.1. Inter-Project CIA: Existing Projects

Existing projects and activities that continue to affect shared environmental and social receptors with the proposed project, i.e. projects that continue to adversely alter the baseline without the proposed project, are detailed in this section. These developments and activities are all likely to be placing pressure on the Lagoon environment (the receptor which all projects interact with), in addition to the natural processes, as discussed in Section 6.23. The CIA is presented in

Table 41, which presents impacts arising from activities undertaken during the construction and operations of the proposed project; other projects and activities that would contribute and potentially worsen these impacts; the combined impacts; with additional mitigation identified and a brief concluding statement. The additional mitigation measures included in the table are further measures than those already identified in the assessment presented in the previous sections.

The assessment throughout Chapter 8 provides further information on the proposed project's impact (e.g. nature of impact and value of receptor). Additional combined impacts have been included in Table 41 as the potential impacts become potentially greater when combined with other projects.

- **Salt Works:**

The Salt Works have profoundly changed the functioning and ecology of the Lagoon area, particularly in the southern end; decreased circulation and accompanied siltation and lowering of water clarity and quality with increased temperatures and salinity. It is assumed that these changes to the Lagoon and wetland area have established and do not continue to directly contribute to the siltation of the Lagoon. Therefore, is not assessed further.

Some of the natural wetland and Lagoon areas has been reclaimed for use as evaporation ponds. These evaporation ponds are maintained and during maintenance activities there is potential to disturb birds within the Ramsar site. This has been considered in the assessment – see Table 41.

Conversely, the potential impacts on the Salt Works from the potential disturbance and resettlement of pollutants (e.g. heavy metals) in the marine sediments from dredging activities are unlikely to occur, as discussed in Section 8.6.6. This is therefore not assessed further.

- **Fish Factories:**

The operations of the fish factories discharge high BOD liquid waste effluent into the marine environment. This waste effluent is compounding the already oxygen-stressed condition of the Bay, particularly along its eastern shore (OLRAC, 2009). The proposed project will not discharge liquid waste effluent into the marine environment. Therefore, there is no potential for combined impacts to occur as a result effluent discharges from the proposed project and the fish factories. There is potential however for these discharges to contribute to the continual combined adverse impacts on the Lagoon's water quality and indirectly impacting the ecology of the Lagoon and Ramsar site. These have been assessed and are presented in Table 41.

- **Diversion weir on the Kuiseb river:**

In the 1960's the Kuiseb river was diverted which alters the natural flow during flood events. This has resulted in a reduction in the size of the Lagoon and more importantly, the natural process of nutrients being brought into the Lagoon from inland has stopped. The discontinuation of this source of nutrients continues to have an adverse impact on the Lagoon environment and dependent features, namely birds (as described in Appendix H). There is potential that this river diversion in combination with a reduced flow into and out of the Lagoon may reduce nutrients even more, therefore this potential impact has been considered in the assessment and presented in Table 41.

- **Namport Operations and the phase 1 Container Expansion:**

Annual maintenance dredging is undertaken for the entrance channel, turning circle and tanker basin for the South Port. This activity is likely to generate suspended solids which will enter the water column, however the likelihood of suspended solids being transported into the Lagoon is low (Namport, 2006). Since (Namport, 2006) was issued, the first phase of the Namport Container Expansion project has been constructed. This is a solid structure in the marine environment that will reduce the suspended solids spreading from the area during maintenance dredging (Delta Marine Consultants, 2010). Whilst this impact is unlikely, there is local concern around sedimentation and the siltation of the Lagoon, therefore it has been considered in the assessment.

An additional impact could be the increase in sulphur events due to disturbing sediment on the ocean floor and the subsequent release of gases. However, the same areas in the Namport boundaries are dredged each year, therefore is assumed that the buildup of gasses is minimized and limits sulphur events. This impact has therefore not been considered further, as it is unlikely that in combination impacts will occur with the proposed project's dredging activities.

The use of marine vessels and boats to undertake these activities increase noise levels and the risk of potential pollution in the marine environment, therefore continually adversely affect the marine wildlife and water quality. This potential impact in combination with the proposed project has been considered.

- **Tourism:**

Tourism activities in particular activities in the marine environment and along the coastline, can result in human-wildlife interactions; disturbance to resting / feeding birds and mammals; feeding wildlife and altering behaviors; and potentially increase pollution (e.g. oil, fuel, rubbish). The proposed project will undertake activities (namely dredging) in the marine environment during construction and there will be an increase in recreational boats using the Marina and surrounding area (not the Lagoon) during the operational phase, therefore an increase in number of boating activities in the Bay area. There is potential for these combined impacts to continually adversely affect marine life, therefore this has been considered in the assessment and presented in Table 41.

8.9.2.2. ASSESSMENT OF EXISTING INTER-PROJECT CUMULATIVE IMPACTS

The shared environmental and social receptors which are continually being influenced by anthropogenic influences and natural processes, and thus resulting in adverse changes, are the Lagoon's water quality and sedimentation rates, marine flora and fauna, the avian community, and the Ramsar site.

Table 41 sets out the findings of the assessment of combined impacts of existing projects and activities that continue to affect shared environmental and social receptors with the proposed project. The aims of this assessment are to identify what impacts could be significantly worsened as a result of the construction and operation of the proposed development when considering other existing project impacts; identify if the proposed project is considered to be the responsible project for tipping the impact into being significant; and identify further mitigation that can be implemented to further reduce these impacts.

The impacts of the other projects have been derived from undertaking a desk-top study through investigating how the baseline has changed over the years and is expected to change (trends), which has included a review of specialist studies undertaken to-date, as well as the application of professional judgement. The assessment methodology in Chapter 7 and the significance matrix have been applied.

Table 41 – Inter-project and existing project's cumulative impacts

RECEPTOR	PROPOSED PROJECT ACTIVITY	PROPOSED PROJECT POTENTIAL IMPACT	SIGNIFICANCE	OTHER PROJECTS	SIGNIFICANCE OF COMBINED IMPACT	SIGNIFICANCE OF COMBINED IMPACT AFTER ADDITIONAL MITIGATION	ADDITIONAL MITIGATION AND CONCLUSION
Water Quality of the Lagoon: Nutrients	Presence of the Marina infrastructure (operations)	The flow into and out of the Lagoon may alter slightly; the magnitude of change is considered to be minor.	Adverse Low	• Continual impacts resulting from the diversion of the Kuiseb river (loss of nutrients entering the Lagoon)	Adverse Low	Adverse Low	The presence of the Marina is will not affect the flow of nutrients entering the Lagoon. The diversion of the Kuiseb river is considered to be the responsible project for this issue.
Water Quality of the Lagoon: suspended sediments	Construction activities in the marine environment (dredging, piling)	Flora and fauna directly affected by suspended sediments, leading to a reduction in light. Short duration, localised area, negligible change to the baseline, minor change to the baseline.	Adverse Minor	• Namport annual maintenance dredging and suspended solids being transported to the Lagoon (deemed unlikely) • Natural siltation and sedimentation	Adverse Minor	Adverse Minor	In the event that dredging activities occur simultaneously, there is potential for a cumulative short-term impact in the Bay area (not the Lagoon). It is unlikely that a combine impact on the Lagoon will occur. If undertaken at different times, the severity may be reduced, but the impacts duration will be longer. Monitoring of the Bay area and Lagoon should be undertaken to monitor turbidity and if thresholds are breached, further mitigation measures such as a silt curtain should be deployed. (see recommendations in Chapter 10)
Water Quality: suspended sediments	Maintenance dredging of Access Channel and Outer Marina (operations)	Flora and fauna directly affected by suspended sediments, leading to a reduction in light. Short duration, localised area, negligible change to the baseline.	Adverse Low	• Namport annual maintenance dredging and suspended solids being transported to the Lagoon (deemed unlikely) • Natural siltation and sedimentation	Adverse Low	Adverse Low	

RECEPTOR	PROPOSED PROJECT ACTIVITY	PROPOSED PROJECT POTENTIAL IMPACT	SIGNIFICANCE	OTHER PROJECTS	SIGNIFICANCE OF COMBINED IMPACT	SIGNIFICANCE OF COMBINED IMPACT AFTER ADDITIONAL MITIGATION	ADDITIONAL MITIGATION AND CONCLUSION
Marine flora and fauna Local community	Construction activities in the marine environment (dredging, piling)	Potential sulphur events leading to anoxic and toxic water quality, leading to indirect impacts on local fauna and flora	Adverse Minor	• Namport annual maintenance dredging and suspended solids being transported to the Lagoon (deemed unlikely) • Natural disturbance (e.g. storms)	Adverse Minor	Adverse Minor	The Namport dredging operations occur in the same location each year, therefore the proposed project will not contribute more to this combined impact. This impact would be short term and localised. The dredging operations will occur in different areas therefore the likelihood for the two projects to affect the same receptor is unlikely. The proposed project will not generate sulphur eruptions due to the nature of the sediments in the lagoon area and also considering the dredging method to be used
Marine flora and fauna	Increased boat activity during both construction and operations	Elevated pollution levels (various sources) directly impacting the water quality, and indirectly impacting flora and fauna.	Adverse Low	• Namport annual maintenance dredging and other activities • Increase tourism numbers and thus marine activities / boats in the water • Increase in vessels due to the operations of phase 1 Namport Container Expansion project.	Adverse Low	Adverse Low	The addition of 70 boats in the water will increase potential pollution risk and may contribute to the cumulative impact; however, in comparison to the current situation, the magnitude of change of these additional boat numbers is low. The proposed project is not considered to be the responsible development for this issue and it is unlikely that the situation will be significantly worsened.

RECEPTOR	PROPOSED PROJECT ACTIVITY	PROPOSED PROJECT POTENTIAL IMPACT	SIGNIFICANCE	OTHER PROJECTS	SIGNIFICANCE OF COMBINED IMPACT	SIGNIFICANCE OF COMBINED IMPACT AFTER ADDITIONAL MITIGATION	ADDITIONAL MITIGATION AND CONCLUSION
Ramsar Site	Construction and operation	Potential threats to the integrity of the RAMSAR Site through reduced water quality and indirect impact on bird populations. Even though the proposed project would likely result in minor change to the baseline and the nature of the impacts would be miner, a moderate adverse impact is predicted due to the nature and importance of this receptor (considered to be of high value in accordance with the EIA methodology in Chapter 7).	Adverse Moderate	• Natural siltation and sedimentation • Increase tourism numbers and thus marine activities and land-based activities • Maintenance activities in the Salt Works and Evaporation Ponds – disturb birds • Fishing Industry – discharges of high BOD liquid effluents which contribute to poor water quality in the Bay and Lagoon, indirectly impact the ecosystem	Adverse Moderate	Adverse Moderate	The current other projects and activities have an influence on the Ramsar site and the proposed project is expected to contribute to these impacts. Whilst the nature and severity of impacts from all projects (including the proposed project) is considered to be minor (insignificant), the international importance of this site (high value/sensitivity) results in the impacts being moderately adverse. No further mitigation for the proposed project has been identified during this assessment however associated recommendations have been made (see recommendations in Chapter 10)
Avian Fauna	Construction and operational noise	Birds disturbed during feeding or roosting, birds avoiding the area, reduced diversity in area around the site. Minor change to the baseline due to short term, localised activities.	Adverse Minor	• Maintenance activities in the Salt Works and Evaporation Ponds • Increase tourism numbers and thus marine activities and land-based activities • Increase noise levels from the first phase of Namport's Container Expansion project (increased land based	Adverse Minor	Adverse Minor	Whilst noise levels are increasing in the proposed project site area, the majority of the birds are found further in the Lagoon and Salt Works. In addition, the contribution of the proposed project to the noise levels that may affect birds will be for a short duration, therefore the proposed project is unlikely to significantly worsen the potential impacts.

RECEPTOR	PROPOSED PROJECT ACTIVITY	PROPOSED PROJECT POTENTIAL IMPACT	SIGNIFICANCE	OTHER PROJECTS	SIGNIFICANCE OF COMBINED IMPACT	SIGNIFICANCE OF COMBINED IMPACT AFTER ADDITIONAL MITIGATION	ADDITIONAL MITIGATION AND CONCLUSION
				and off-shore activities)			
Marine Mammals & Prey Fish	Construction and maintenance dredging – suspended solids, noise and other disturbances	Increase in suspended solids could disturb feeding ground of marine mammals and prey fish, and underwater noise generated from dredging activities could both result in marine mammals not frequenting the area and indirectly impacting the tourism industry. The predicted magnitude of change is negligible due to the duration of dredging activities and the mobility of the dolphins, however due to the local value of these marine mammals (medium), the impacts are considered to be moderate significance.	Adverse Moderate	• Namport annual maintenance dredging and suspended solids in the Bay area • Natural disturbance (e.g. storms)	Adverse Moderate	Adverse Moderate	In the event that dredging activities occur simultaneously, there is potential for a cumulative short-term impact in the Bay area (from noise and suspended solids). If undertaken at different times, the severity may be reduced, but the combined impacts will last longer. Monitoring of the Bay area and Lagoon should be undertaken to monitor turbidity and if thresholds are breached, further mitigation measures such as a silt curtain could be deployed. (See recommendations in Chapter 10)

The findings of the CIA for the proposed project in combination with existing projects that will continue to adversely influence the future baseline, demonstrates that the proposed project will marginally contribute to these continual changes; however, the contribution to these changes from the proposed project are considered to be insignificant and it is unlikely that the proposed project will be the responsible development of the incremental changes.

8.9.2.3. INTER-PROJECT CIA: PLANNED OR REALISTICALLY DEFINED PROJECTS

The first stage of assessing the inter-project cumulative impacts of planned or reasonably defined projects that could potentially have an impact on shared environmental or social receptors as the proposed project, is to identify those projects.

As part of economic development and working towards the targets set out in the 5th NDP (National Planning Commission, 2017), Walvis Bay is expected to see significant growth through the direct and indirect modernising and industrialising of the major sectors of agriculture, fisheries, manufacturing, mining and tourism. The key future growth and development plans set out in the 5th NDP for the next four years that will affect Walvis Bay include:

- *'Namibia to be the key fisheries and processing hub in the South East Atlantic Ocean through increasing the volume of fish handled, canned or processed in Walvis Bay cumulatively by 40%';*
- *'Namibia has an integrated mining industry value chain doubling the share of valued added mining exports from 2015';*
- *'Namibia has a diversified and competitive tourism sector increasing the number of tourists' arrival from 1.4 million to 1.8 million';*
- *'Namibia has a sustainable transport system supporting a world-class logistics hub connecting SADC to international market'; and*
- *'Namibia has diversified and increased exports of manufactured goods from 44% to 60%'.*

To accommodate the plans set out in the 5th NDP, various developments will be required. These can be as a direct need, e.g. the development of the Walvis Bay Port or as an indirect consequence, e.g. residential properties to accommodate an increase in population growth as a result of industrial growth. The growth of the town of Walvis Bay will be substantial over the next 12 years and beyond (the IUSDF sets out plans up to 2030), which will include various types of developments as set out in Section 6.11.1.

As discussed in Section 6.24, the environment in Walvis Bay, in particular the Lagoon and surrounding the proposed project site is not a static environment; it is constantly changing as a result of historical and existing anthropogenic and natural influences. In particular, the following future developments have the potential to cause environmental and social impacts that are likely to result in incremental impacts, on areas or resources used by or directly impacted by the proposed project:

a. Walvis Bay South Port Terminal: Phase 1 of the Namport's Container Expansion project becoming operational;
b. Walvis Bay South Port Terminal: Construction and operation of both phases 2 and 3 of the Namport's Container Expansion project;
c. Namport's Waterfront and Marina;
d. Walvis Bay North Port Terminal;
e. Development of a hotel and casino on erven 4941; and
f. Lovers Hill development.

In addition to these proposals there may be other developments such as improvements to infrastructure (sewerage, bulk water, electrical transmission system, roads and paths), however these are unknown. Various activities that may

not necessarily be developments, could also contribute to altering or affecting the environment and society. These include, but are not limited to:

- Increased population as well as tourists and visitors to the Walvis Bay area; and
- Increase in activities within the marine environment (tours, recreational boat users, sporting activities and fishing).

The actual impacts as a result of the construction, operations and decommissioning of projects c to f listed above are unknown. Concept plans may exist for the waterfront and marina, and the North Port; however, no data, design, construction methodology, scheduling of the project or information on how the development would operate is publicly available. In line with IFC Assessment Guidance these developments are not considered as realistically defined projects in (see Section 3.2) (International Finance Corporation, 2013). A high level qualitative assessment has therefore been undertaken to identify potential impacts on key receptors to provide an indication of the likely impacts.

Phases 2 and 3 of the Namport's Container Expansion project is considered as a realistically defined and committed development as an Environmental Clearance Certificate has been obtained. The EIA undertaken for the Namport project has been reviewed and where available, assessment findings used to identify the potential cumulative impacts. Several limitations of the Namport EIA were identified during this review, which limits the scope and conclusions of this CIA, in particular, a schedule of construction works of phases 2 and 3 is not provided; the sedimentation plume modelling for the construction works of phases 2 and 3 was not undertaken; the number of marine and road vehicles were not provided for the Namport operations phase; and a comprehensive CIA was not undertaken. These limitations are highlighted where applicable.

8.9.2.4. FUTURE BASELINE

Due to the local environment, in particular, the Lagoon environment being a dynamic and shifting environment, it is important to consider potential changes to the baseline when undertaking the CIA. The changing environment is expected to occur as a result of both historic, existing and future anthropogenic influences and natural processes (see Section 6.24. In particular, throughout this ESIA report, the following aspects of the current baseline have been noted as changing and resulting in a noticeable shifting baseline, which is expected to continue to change. These changes have considered the future growth of the town to a degree.

- Natural sedimentation in the Lagoon.
- Water quality in the Bay and the Lagoon.
- Flow into and out of the Lagoon.
- Geomorphological changes through wave action, currents and sediment supply.
- Changes in avian populations, diversity and numbers.
- Movements of marine mammals.

Whilst considering the development of the realistically defined projects and the dynamic local environment, it is expected that the baseline environment, in particular, the changes listed above, will continue to alter without the development of the proposed project, meaning the proposed project is unlikely to significantly alter the predicted changes of the future baseline. The assessment findings documented in the previous section assessed the magnitude of change that the proposed project would cause as the predicted changing environment without the future realistically define projects. The next section considers the future baseline, the proposed project and the potential future developments and activities.

8.9.2.5. ASSESSMENT OF IMPACTS: QUALITATIVE ASSESSMENT

Whilst the projects c to f listed above (Namport's waterfront and marina; Walvis Bay North Port Terminal; development of a hotel and casino on erven 4941; and Lovers Hill development) have limited available information and thus a robust assessment cannot be undertaken (nature of impacts and magnitude of change cannot be determined), it is important to recognise that the combined impacts of the development of the waterfront area (proposed project and existing waterfront area) could result in negative and beneficial impacts.

The findings of the proposed project impact assessment (presented in Sections 8.4 to 8.8) concluded that the following receptors would likely be moderately to majorly adversely impacted during construction and operations, and therefore additional impacts to these receptors from other development or activities (such as the projects c – f listed above as well as the activities) could contribute to these impacts and further worsen them, potentially making them significant.

- **The Raft:** potential loss of patrons leading to loss of revenue during construction phase;
- **The community:** community severance from increased traffic, disturbance from noise, dust, change to sense of place, change in seascape and landscape character, and localised visual impacts;
- **Integrity of Ramsar:** impacts on the attributes that make up the Ramsar site (e.g. Lagoon water quality and Lagoon ecology and avian life); and
- **Marine mammals:** disturbance during construction phase.

The combined inter-project impacts on these receptors cannot however be easily quantified mainly due to the lack of other project scheduling information (e.g. when construction would start, how long it would take, when operations commence); the construction of projects c to f listed previously could occur at the same time, or they could occur at different times. It is considered likely that the construction of the proposed project would not coincide with the construction of any of these projects, therefore the combined impacts would occur during the operations of the proposed project and the construction and then operations of the other projects. The increase in tourist numbers and population, and increase in marine activities will continue gradually, however the impacts are more likely to be seen during the operational phase of the proposed project.

The magnitude of change, and nature and severity of impacts caused by the construction and operations of projects c - f will determine the level of significance of the cumulative impacts on these receptors. This information is currently unknown; therefore, significance cannot be determined or suitable mitigation. Recommendations have been proposed as a result of the findings of this ESIA, which are detail in Chapter 10.

The construction of the projects c- f are unlikely to require activities to be undertaken in the marine environment (based on early concept designs). The Namport container terminal project includes a marina breakwater; however, this is included in the phase 1 Namport Container expansion project and is currently (at the time of writing) being constructed. Therefore, inter-project cumulative impacts on the water quality and the Lagoon environment during construction is unlikely to be significant.

Whilst the operations of the proposed project are unlikely to result in significant impacts in the marine environment, it is recognised that there is potential for inter-project cumulative impacts on the marine environment, in particular the Lagoon environment which forms an integral component of the Ramsar site. Impacts could arise due to increased tourism and visitors to the area. One of the key issues is human-wildlife interactions due to an increase in marine based tourism activities, potentially resulting in a disturbance, injury and mortality to birds and marine mammals. At this stage, these impacts can also not be quantified, but it is recognised as a risk and thus a recommendation has been presented (see Chapter 10).

8.9.2.6. ASSESSMENT OF IMPACTS: NAMPORT CONTAINER EXPANSION PROJECT

Phase 1 of the Namport's Container Expansion project is 76% complete and is expected to become operational in 2019. Phases 2 and 3 are unlikely to be constructed before 2025. The operations of phase 1, and construction and operations of phases 2 and 3 are included in the CIA.

An EIA was undertaken for the Namport Container Expansion project (Delta Marine Consultants, 2010), therefore data, information and an impact assessment is available for use in the CIA. As stated earlier, this information is limited in areas.

The methodology between the Namport EIA and the proposed project ESIA differ, in particular with the definition of duration and significance. Whilst a comparison exercise is not intended here, or an evaluation of the assessment methodology and thresholds applied, it is important to recognise these differences, as it will have an influence on the CIA. The key differences that influence the CIA are summarized in Table 42.

Table 42 – EIA Methodology differences

METHODOLOGY	PROPOSED PROJECT ESIA	NAMPORT EIA
Duration	Three thresholds: • Short-term • Medium-term • Long-term Permanent and temporary are considered as reversibility. An impact could for example be a short-term permanent impact, i.e. the change is permanent but effects short-term.	Five thresholds: • Temporary (less than 1 year) • Short term (1 to 6 years) • Medium term (6 to 15 years) • Long term (the impact will cease after the operational life of the activity) • Permanent
Significance	Four levels of adverse significance: • Major • Moderate • Minor • Low	Three levels of adverse significance: • High • Medium • Low to very low

Whilst there is a difference in the Significance ratings, the definitions are similarly aligned. Therefore, the duration ratings (and reversibility) are the key differences.

The Namport Container Expansion project EIA report concludes that *'no impacts of high significance as a consequence of the proposed terminal expansion were identified…'.* Whilst applying the methodology, this conclusion may be correct, however an example of where different methodology can alter the findings is as follows.

Section 5.3.1.1.1 of the Namport EIA report states the following *'…it is considered extremely unlikely that any sediment arising from dredging, deposited in the lagoon, will be detectable and the significance of this impact will be low to very low.'* This predicted impact includes impacts on the marine ecology. The assessment concludes that the impacts would be short-term. Studies undertaken as part of this ESIA (Appendix H) have concluded that potential changes to the avian community of the Lagoon have significantly altered in numbers before, during and after the Namport phase 1 construction works. This impact is as a result of increased the sedimentation in the Lagoon which can be attributed to the Namport construction activities. Approximately one year after the Namport marine construction works, the number of birds started to recover, however it is currently unknown if these impacts will be completely reversed or the duration in which the impact will last for. A short-term impact defined in Namport's EIA is *'The timeframe during which the impact will be experienced (1 to 6 years)'*, therefore the assessment findings is considered appropriate if a full recovery of the impact is achieved within 6 years.

It should be noted at this stage that the indirect impacts on the avian community in the Lagoon (and thus the integrity of the Ramsar site) from sedimentation was not thoroughly assessed in the Namport EIA. Only Lagoon refreshment rates and the indirect impacts on the avian community were assessed.

If the methodology in this ESIA report were to be applied, a medium-term impact and temporary reversibility would have been applied *'Impacts that are likely to continue after the activity causing the impact and are recoverable'*, thereby making the overall magnitude of change as moderate and the significance of impact as moderate adverse; higher than the Namport conclusions due to differing methodology.

Taking into consideration these differences, the thresholds defined in this ESIA impact assessment methodology (see Chapter 7) have been applied to the CIA when assigning a level of significance, in addition, the precautionary principle has been applied where there are uncertainties. The level of significance from both assessments is after mitigation has been applied.

The following have also been considered in the inter-project CIA:

- The second and third phases of the Namport Container Expansion project will not be constructed prior to 2025 (Gelderbloem, 2018), therefore the proposed project will be in the operational phase when these activities commence.
- Operational impacts of the proposed project and construction and operations of the 2nd and 3rd phases have been considered in this inter-project CIA.
- The operational activities and associated impacts of phase 1 have been considered.
- It is believed that the assessment presented in Namport's EIA is focused on phase 1 in places, and therefore broad assumptions have been applied where impacts associated with phases 2 and 3 are lacking, using the assessment findings concluded from phase 1. Some data for phase 1 is limited, for example the number of road and marine traffic.
- The combined impacts of operating all three phases have been considered, however this is based on assumptions due to lack of information in the Namport EIA.
- The significance of the inter-project cumulative impacts has applied the methodology and significance matrix presented in Chapter 7.

The inter-project CIA is presented in Table 43. The first column presents the receptor that could be affected; column two presents the activities that would cause the impacts; the third column presents the significance of the impact on the receptor that was identified in this ESIA (Sections 8.4 to 8.8); column 4 presents the significance of the impact on the receptor that was identified in the Namport EIA report; column 5 presents information of these impacts and the likely responsible project for the combined impact; and the sixth column presents the significance of the inter-project cumulative impacts (combined impacts) on each receptor as result of the proposed project and Namport's project.

To summarise, inter-project cumulative impacts have been derived using the following simple equation:

IMPACTS FROM PROJECT 1 ACTIVITIES + IMPACTS FROM PROJECT 2 ACTIVITIES = COMBINED IMPACT ON THE SAME RECEPTOR

Various recommendations have been identified during this assessment and are listed at the end of the Chapter.

Table 43 – Inter-project cumulative impacts of the proposed project and Namport Container Expansion project

RECEPTOR	ACTIVITY	PROPOSED PROJECT	NAMPORT	COMBINED IMPACT	SIGNIFICANCE	IMPACT ASSESSMENT
Water Quality: Refreshment rates in the Lagoon	Operations of Namport phases 1, 2 and 3	Low	Low	**THE WALVIS BAY WATERFRONT PROJECT** The proposed project was assessed as having negligible impacts on the flow into and out of the Lagoon. **NAMPORT PROJECT** The Lagoon refreshment rate was modelled to reduce by 10-15% under certain conditions when all three phases of the port extension is built. This is likely to result in a long-term impact on the Lagoon environment, that is unlikely to be irreversible. **COMBINED** The proposed project is considered not to significantly worsen the predicted impacts on the Lagoon's refreshment rates, and it is the combined impacts of phases 1, 2 and 3 that are likely the main contributors to this overall cumulative impact.	Moderate	**THE WALVIS BAY WATERFRONT PROJECT** No mitigation measures were identified for the proposed project due to the negligible impacts.
The Lagoon, Water Quality: Heavy Metals and other pollution	Construction of phase 2 or 3 Disturbance of heavy metals	Negligible	Low	**THE WALVIS BAY WATERFRONT PROJECT** Maintenance dredging for the proposed project will occur in specific areas every two and five years. There are limited heavy metals found in the Lagoon area, therefore limited impact. The proposed project will not discharge waste effluent to the marine environment. **NAMPORT PROJECT** During the construction of phases 2 and 3, there is potential to mobilise harmful elements and compounds. The assessment concludes that limited pollutants were unlikely to be found in the dredged material, therefore limited impacts. Actual findings / real data collected during from phase 1 should be available, which should be reviewed and considered when reviewing the cumulative impacts of phases 2 and 3 – see Chapter 10 for recommendations.	Low	**THE WALVIS BAY WATERFRONT PROJECT** No mitigation measures were identified for the proposed project due to the negligible impacts.

RECEPTOR	ACTIVITY	PROPOSED PROJECT	NAMPORT	COMBINED IMPACT	SIGNIFICANCE	IMPACT ASSESSMENT
				COMBINED The combined impacts of disturbing heavy metals and spreading contamination is not considered significant.		
The Lagoon, Water Quality: Sedimentation	Construction of phase 2 or 3	Minor	Low	**THE WALVIS BAY WATERFRONT PROJECT** The proposed project will minimise suspended solids through mitigated dredging operations and best available technology. Due to the duration and occurrence (every 2 and 5 years), localised nature and dredging techniques, the impacts has been assessed as minor. The indirect impacts would be on marine mammals, the bird life, fish and phytoplankton, which is assessed to be minor significance. **NAMPORT PROJECT** The Namport project is likely to cause increased siltation and sedimentation during construction works. The Namport assessment considered *'it to be extremely unlikely that any sediment suspended during dredging that might be deposited in the Lagoon will be detectable, nor would it have an impact on marine ecology'* (including birds). Through the impacts assessment process undertaken for the proposed project, it was found that considerable amounts of sedimentation had entered the Lagoon during the construction period which caused a considerable change to the avian community. Namport's construction activities are most likely a key contributor to this – see Appendix H. Therefore, it is assumed that similar sedimentation in the Lagoon will occur during phases 2 and 3. It is possible that sedimentation load and rates may differ due to the new structure of phase 1, which has altered the currents in the Bay. However due to this uncertainty, the	Moderate	**THE WALVIS BAY WATERFRONT PROJECT** Most appropriate dredger (sucking system/Watermaster), undertaking activities on outgoing tide, turbidity monitoring, use of a bund, silt curtain, sequencing and scheduling, all dredging over seen by suitable qualified person. **NAMPORT PROJECT** It is understood that Namport undertook water monitoring during the first phase of construction. Recommendation No. 3 in Section 10.3.4 includes a recommendation for Namport to review this data and undertake an assessment prior to phases 2 and 3.

RECEPTOR	ACTIVITY	PROPOSED PROJECT	NAMPORT	COMBINED IMPACT	SIGNIFICANCE	IMPACT ASSESSMENT
				significance of cumulative impacts is considered to be moderate. **COMBINED** Whilst the proposed project may marginally contribute to sedimentation (if mitigation measures are not applied) in the Lagoon, it is believed that it would not be considered as the responsible development for the incremental impacts and it is unlikely to significantly worsen the impact to the Lagoon. To reduce impacts, the scheduling of dredging for both projects should be considered – it may be best to undertake these at different times to ensure the magnitude of change is kept to a minimum. Water quality monitoring should also be undertaken collaboratively; this has been included as a recommendation in Chapter 10.		

RECEPTOR	ACTIVITY	PROPOSED PROJECT	NAMPORT	COMBINED IMPACT	SIGNIFICANCE	IMPACT ASSESSMENT
The Lagoon: & Ramsar Site	Construction and Operations	Moderate	No assessment	**THE WALVIS BAY WATERFRONT PROJECT** The impacts on the Lagoon and other areas that make up the Ramsar site can combine and result in impacts on the qualifying features of the Ramsar site. Whilst the project is likely to result in minor changes to certain attributes and will contribute to the cumulative impacts on the Ramsar site, the proposed project is not considered to be the responsible development for this issue and it is unlikely that the situation will be significantly worsened. **NAMPORT PROJECT** The lack of a holistic assessment for the potential impacts specifically on the Ramsar site in the Namport EIA limits this assessment. The Lagoon refreshment rate and potential impacts on benthic fauna and bird populations was assessed, which concluded low adverse impacts, not significant. This is only one impact that could affect the receptor. **COMBINED** It is assumed, that Namport will likely be the main contributor to the incremental impacts and potential significant impacts on this receptor, due to siltation and sedimentation witnessed and indirect impacts recorded during construction works; increase risk in pollution events during both construction and operation; changes to the Bay's current pattern and the Lagoon's refreshment rate; and changes to natural sediment transport. Due to these uncertainties as well as the uncertainties of the magnitude of change and the duration of these changes, a significance of major adverse impacts has been derived due to the international value of the site as well as the local and national important.	Major	**THE WALVIS BAY WATERFRONT PROJECT** Most appropriate dredger (sucking system), turbidity monitoring, use of a bund, silt curtain, sequencing and scheduling, well maintained and serviced equipment, all dredging over seen by suitable qualified person. **NAMPORT PROJECT** It is understood that Namport undertook water monitoring during the first phase of construction. Recommendation No. 3 in Section 10.3.4 includes a recommendation for Namport to review this data and undertake an assessment prior to phases 2 and 3. **COMBINED** Section 10.3.4 includes a recommendation (No. 2) for a CIA to be undertaken for the Ramsar site so that environmental quality objectives and thresholds can be defined which can be used in future EIAs, especially projects that have the potential to cause significant impacts . A detailed CIA has been undertaken for this project that determined this project would not significantly alter the baseline even in combination with other existing projects. To avoid the scale of work conducted in this ESIA for the CIA, and to improve the quality of EIAs in the region, a holist CIA is recommended but is not required for this project, as it has already been completed.

RECEPTOR	ACTIVITY	PROPOSED PROJECT	NAMPORT	COMBINED IMPACT	SIGNIFICANCE	IMPACT ASSESSMENT
Water Quality: Pollution	Construction and operations	Low	Not assessed	There is risk for pollution such as oil and fuel to enter the marine environment as a result of boats in the water for both projects. The Namport EIA has not undertaken an assessment on the potential impact from an increase in marine traffic, both from the construction and operations of each phase. **COMBINED** Due to the lack of data, it is assumed that the individual projects result in a low impact, however the impact worsens when the projects are combined. This combined impact has been assessed as minor.	Minor	**COMBINED** Well maintained and serviced equipment, Code of Conduct, designated refuelling area. Inner marina provides contaminant area. Spill response booms to be housed on site in the event of a spill. Rubbish collection points built into the design
Avian community: impacts from noise	Construction and operations	Minor	Not assessed	**THE WALVIS BAY WATERFRONT PROJECT** The noise from the proposed project site during operations is likely to be a small change to the current environment. There is potential to impact birds, however this impact will be localised. **NAMPORT PROJECT** The construction noise from Namport is assessed as being of low significance to local residents, therefore it can be assumed a similar impact to birds due to the added distance from the Lagoon area. **COMBINED** The combined impacts are assumed to be minor whilst taking a precautionary approach. The proposed project would likely be the responsible development for the incremental impacts on bird life in the Lagoon due to noise as it is in closer proximity to the site and marine activities are also likely to contribute. The Namport activities would contribute to these noise levels.	Minor	**THE WALVIS BAY WATERFRONT PROJECT** Continual twice-yearly bird monitoring

RECEPTOR	ACTIVITY	PROPOSED PROJECT	NAMPORT	COMBINED IMPACT	SIGNIFICANCE	IMPACT ASSESSMENT
Marine mammals: impacts from construction noise, marine traffic noise and human-wildlife interactions	Construction of phase 2 or 3	Minor	Not assessed	**THE WALVIS BAY WATERFRONT PROJECT** Due to the local importance of dolphins, the potential adverse impact is considered to be minor, even though the magnitude of change is expected to be limited (background noise, increase in small crafts and boats). During maintenance dredging, the dolphins are likely to avoid the area for the very short duration. **NAMPORT PROJECT** During the construction of phase 1, dolphins avoided the area during dredging works. It is assumed the same thing would occur for the construction of phases 2 and 3 which could take approximately 8 years of construction, with long periods of dredging activities. In addition, the increase in marine vessels and traffic will also likely contribute to marine noise and potentially interact with marine mammals. **COMBINED** The potential cumulative impacts are likely to result in a moderate adverse impact – they are considered to be long-term impacts but will have some regional importance due to the possibility of dolphins staying away from the areas for long durations, thereby affecting the ecology of the area and the tourism industry. The proposed project will contribute to this cumulative impact, however is it not considered to be the responsible development for the incremental impacts.	Moderate	**COMBINED** Continual engagement with the Namibian Dolphin Project. **COMBINED** Section 10.3.4 includes a recommendation (No. 3) for a CIA to be undertaken for the future development of Walvis Bay. The findings of the assessment should illustrate the future carrying capacity of the receptors in the area and suitable development plans and mitigation measures. A detailed CIA has been undertaken for this project that determined this project would not significantly alter the baseline even in combination with other existing projects. To avoid the scale of work conducted in this ESIA for the CIA, and to improve the quality of EIAs in the region, a holist CIA is recommended but is not required for this project, as it has already been completed.

RECEPTOR	ACTIVITY	PROPOSED PROJECT	NAMPORT	COMBINED IMPACT	SIGNIFICANCE	IMPACT ASSESSMENT
Marine mammals: impacts from operational noise, marine traffic	Operations of phases 1, 2 and 3	Minor	Low	**THE WALVIS BAY WATERFRONT PROJECT** Due to the local importance of dolphins, the potential adverse impact is considered to be minor, even though the magnitude of change is expected to be limited (background noise, increase in small crafts and boats). During maintenance dredging, the dolphins are likely to avoid the area for the very short duration. **NAMPORT PROJECT** In addition to the above, increased ship and vessel traffic will occur as a result of the activities and operation of phases 1, 2 and 3, which is likely to increase marine noise and human-wildlife interactions. The Bay area will likely become more congested and dolphins are more likely to avoid the area, be disturbed or injured. **COMBINED** Combined impacts are therefore likely, however the proposed projects is not considered to be the responsible development for this incremental impact.	Minor	**COMBINED** Continual engagement with the Namibian Dolphin Project. **COMBINED** Section 10.3.4 includes a recommendation (No. 1) for a CIA to be undertaken for future development of Walvis Bay. The findings of the assessment should illustrate the future carrying capacity of the receptors in the area and suitable development plans and mitigation measures. A detailed CIA has been undertaken for this project that determined this project would not significantly alter the baseline even in combination with other existing projects. To avoid the scale of work conducted in this ESIA for the CIA, and to improve the quality of EIAs in the region, a holist CIA is recommended but is not required for this project, as it has already been completed.
Local residents surrounding the proposed project site: noise levels increasing from noise	Construction of phase 2 or 3	Moderate	Low	**THE WALVIS BAY WATERFRONT PROJECT** The local residents surrounding the proposed project site are likely to experience an increase in noise levels due to the operations of the development, and residents along the major access route to the site are also likely to see an increase in noise due to increased traffic levels. **NAMPORT PROJECT** These residents would also be exposed to an increase in noise levels as a result the construction activities of phases 2 and 3, construction traffic, operational activities and operational traffic.	Moderate	**THE WALVIS BAY WATERFRONT PROJECT** Continual communications through the Environmental and Social Manager, monitoring programme implemented as per ESMPs. **COMBINED** Recommendation 4 in Section 10.3.4 of this report includes noise monitoring to be undertaken in collaboration between several stakeholders. This will provide a baseline which can be used in the

RECEPTOR	ACTIVITY	PROPOSED PROJECT	NAMPORT	COMBINED IMPACT	SIGNIFICANCE	IMPACT ASSESSMENT
				COMBINED The proposed project is predicted to be the responsible development that contributes to the majority of the cumulative impacts on the residents surrounding the proposed project site. The Residents on the main vehicle access routes by Namport site and the proposed project site are the responsibility of both developments.		proposed Strategic CIA (Recommendation 1) and other EIAs to ensure the town is developed sustainable. A detailed CIA has been undertaken for this project that determined this project would not significantly alter the baseline even in combination with other existing projects. To avoid the scale of work conducted in this ESIA for the CIA, and to improve the quality of EIAs in the region, a holist CIA is recommended but is not required for this project, as it has already been completed.
Community severance: Construction Traffic	Construction of phase 2 or 3	Moderate	Low	It is noted that the difference between assessment findings is quite different. The Namport assessment focussed on the capacity of the road, impact to pavement infrastructure, safety and accident risk. The traffic assessment for the proposed project focussed on the receptors that would be affected; the severance the community would experience as a result of increased traffic volumes. In addition, a traffic study reviewed the capacity of the local road infrastructure and recommended upgrades which are part of the project, to ensure future capacity is accommodated. This included traffic predictions for phases 2 and 3. **COMBINED** The cumulative impacts are expected to be the responsibility of both developments. A recommendation has been made that considers this impact due to the potential additional contributors that may worsen this impact – see Chapter 10.	Moderate	**THE WALVIS BAY WATERFRONT PROJECT** Continual communications through the Environmental and Social Manager, monitoring programme implemented as per ESMPs. **COMBINED** Section 10.3.4 includes a recommendation (No. 1) for a CIA to be undertaken for future development of Walvis Bay. The findings of the assessment should illustrate the future carrying capacity of the receptors in the area and suitable development plans and mitigation measures. A detailed CIA has been undertaken for this project that determined this project would not significantly alter the baseline even in combination with other existing projects. To avoid the scale of work conducted in this ESIA for the CIA, and to improve the
Community severance: Operations Traffic	Operations of phases 1, 2 and 3	Moderate	Low		Moderate	

RECEPTOR	ACTIVITY	PROPOSED PROJECT	NAMPORT	COMBINED IMPACT	SIGNIFICANCE	IMPACT ASSESSMENT
						quality of EIAs in the region, a holist CIA is recommended but is not required for this project, as it has already been completed.
Local economy: increased workers and families to Walvis Bay:	Construction and Operations of phases 1, 2 or 3	Major	Medium	**COMBINED** The combined impacts of the projects will result in a beneficial impact to the local and regional economy as a result of employment and local spends.	Major Benefit	N/A
Local communities: increased workers and families to Walvis Bay	Construction and Operations of phases 1, 2 or 3	Low	Low	**THE WALVIS BAY WATERFRONT PROJECT** The increase in people moving to Walvis Bay as a result of these project due to job creation would result in adverse cumulative impacts on the pressure local services and social cohesion. The demand and pressure on local services has been considered in the Walvis Bay IUSDF, which sets out provisions to accommodate an increasing population. **NAMPORT PROJECT** The conclusions found from the Namport EIA is that the existing services would accommodate the workforce. **COMBINED** Combined impacts on the local communities as a result of social cohesion is likely and would be the responsibility of both developments.	Minor	**COMBINED** Section 10.3.4 includes a recommendation (No. 1) for a CIA to be undertaken for future development of Walvis Bay. The findings of the assessment should illustrate the future carrying capacity of the receptors in the area and suitable development plans and mitigation measures. A detailed CIA has been undertaken for this project that determined this project would not significantly alter the baseline even in combination with other existing projects. To avoid the scale of work conducted in this ESIA for the CIA, and to improve the quality of EIAs in the region, a holist CIA is recommended but is not required for this project, as it has already been completed.
Landscape and seascape character, local resident views and sense of place	Operations of phases 1, 2 or 3	Moderate	Low	**THE WALVIS BAY WATERFRONT PROJECT** The proposed project is likely to alter local resident views, alter the seascape and landscape character of the local area, as well as change the sense of place. The existing Namport terminal and phase 1 are not currently visible from the proposed project site or surrounding residential properties, and does not	Moderate	**THE WALVIS BAY WATERFRONT PROJECT** Design of development has set-back buildings to minimise impacts on local residents and used local resources to construct the buildings (blend into natural environment). Maintenance of soft landscaping.

RECEPTOR	ACTIVITY	PROPOSED PROJECT	NAMPORT	COMBINED IMPACT	SIGNIFICANCE	IMPACT ASSESSMENT
				contribute to the same seascape character (i.e. cannot be easily viewed in the same viewpoint from sea unless quite far out where the proposed project site is less visible). **NAMPORT PROJECT** The Namport EIA did not consider the six 125m cranes that are currently being installed for the phase 1 (Gelderbloem, 2018). These will be seen from outside of the town limits and will most likely be visible from the proposed project site and surrounding residential properties, thereby contributing to and altering the local views, and landscape and seascape character. This impact was not addressed in the Namport EIA, therefore it is assumed that phase 2 and 3 will include similar infrastructure. Therefore, the overall character of the coastline and views from the town will continue to change, and thus cumulative visual impacts will occur. **COMBINED** The proposed project will be responsible for the adverse changes to the local landscape and seascape character, local residential views and sense of place, and Namport will contribute to this cumulative impact, however will not make it significantly worse. This is a long term, local and direct impact. However, people adapt and will become accustomed to the change in landscape and seascape character.		**COMBINED** Section 10.3.4 includes a recommendation (No. 1) for a CIA to be undertaken for future development of Walvis Bay. The findings of the assessment should illustrate the future carrying capacity of the receptors in the area and suitable development plans and mitigation measures. A detailed CIA has been undertaken for this project that determined this project would not significantly alter the baseline even in combination with other existing projects. To avoid the scale of work conducted in this ESIA for the CIA, and to improve the quality of EIAs in the region, a holist CIA is recommended but is not required for this project, as it has already been completed.

The inter-project CIA illustrates that the proposed project would likely be responsible for the following incremental impacts:

- Avian community impacted from noise during operations: Minor cumulative impact;
- Local residents surrounding the proposed project site impacted through increased noise levels: Moderate cumulative impact; and
- Local residents surrounding the proposed project site impacted from change to local views and changes to landscape and seascape character: Moderate cumulative impact.

The potential impacts to the avian community are of both local and international concern. Twice yearly monitoring is undertaken to collect data on number of individuals and species present in the Lagoon and surrounding area. This monitoring will continue and shall be used to monitor the potential impacts arising from the proposed project. A recommendation in Chapter 10 has been made to support the protection of this sensitive and valued receptor.

The increase in noise levels to the local residents would be felt during normal working hours as a result of the Namport traffic, traffic to and from the proposed development and a slight increase from operational activities on the proposed project site. The environmental and social baseline will have changed considerably in the area since Namport undertook their EIA study, and therefore background noise levels may have increased. Several recommendations have been made and documented in Chapter 10 to mitigate impacts from noise on local residents.

Walvis Bay has a dynamic environment, which is constantly changing. Views, landscape and seascape character and sense of place will continue to change, and people will adapt to these changes. The impacts to local residents are expected to reduce over time as people will be accustomed to the changes to their surroundings.

In addition to the above, it is concluded that the proposed project does not jeopardise the sustainability or integrity of the Lagoon environment and Ramsar site; the potential impacts arising from the proposed project are insignificant compared to other project and activities. It is acknowledged that the Lagoon environment is changing and could further be affected by other projects, therefore further collaborative work needs to be undertaken to ensure the Lagoon is protected holistically due to its value. A recommendation detailed below has been included.

8.9.2.7. CONCLUSIONS OF THE CIA

The CIA has assessed the following:

- **Intra-project cumulative impacts:** Cumulative impacts that occur within the proposed project;
- **Inter-project cumulative impacts:** Cumulative impacts that occur as a result of the proposed project in combination with other projects, which is split in to two:
  - Cumulative impacts with existing projects; and
  - Cumulative impacts with future projects.

The conclusions drawn from the CIA demonstrates that the proposed project may contribute to some cumulative impacts, in particular will result in localised cumulative impacts to receptors adjacent to the proposed project site. In a wider context, both temporally and spatially, **the proposed project is unlikely to be the responsible development for significant incremental impacts**, as the degree of this contribution to those impacts is considered to be marginal compared to other developments and activities in the area. It should be noted, that the wider cumulative impacts (not local) are expected to occur without the development of the proposed project.

Various recommendations in Chapter 10 have been identified as a result of the ESIA and CIA. As responsible practitioners and as a responsible proponent, these recommendations have been made so that the Government and the Walvis Bay Municipality can take action to manage and minimise current and future impacts to sensitive receptors in Walvis Bay.

9 STAKEHOLDER ENGAGEMENT AND CONSULTATION

9.1 INTRODUCTION

Stakeholder engagement forms an important component of the environmental and social assessment process and is defined in the EIA Regulations (2012) as a *"process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to, specific matters".*

The proposed project has developed through several years of planning and consultation with stakeholders and the public.

9.2 EARLY STAKEHOLDER ENGAGEMENT

Consultation started prior to commencing the official stakeholder engagement process commissioned as part of this ESIA study. This included:

- Consultation through the development of the Walvis Bay IUSDF and associated plans;
- General plans and presentations made to neighboring residents and key stakeholders;
- Presentations to council and stakeholders;
- Social media engagements and interactions; and
- The stakeholder engagement process as part of this ESIA.

9.3 STAKEHOLDER IDENTIFICATION

The first stage of consultation involved identifying I&APs. This stage was undertaken between February and May 2017, and involved the following activities:

- Identification of I&APs in proximity to the proposed project site;
- Consultation with the MET to identify the competent authority;
- Consultation and engagement with Walvis Bay Municipality;
- Collection of all addresses for neighbouring properties from the municipality;
- Review of other potentially interested parties including businesses and environmental organisations; and
- Desk-based review to identify Non-Governmental Organisations (NGOs) and other non-statutory stakeholders.

An I&AP database has been developed for the proposed project which contains contact details and potential relationship to the proposed project (see Appendix D).

Throughout this ESIA, stakeholder engagement has been undertaken through face-to-face interviews with neighbouring property owners; meetings; social media engagements; newspapers articles; and written letters to key stakeholders including the Ramsar convention in Switzerland and Namibian Government Ministries.

9.4 COMMUNICATION METHODS

Once the initial list of I&APs was identified, a robust public participation process was undertaken, the aims of which was to identify sensitive environmental and social receptors (either perceived or actual); identify local concerns; present the proposals, encourage feedback and receive any other comments.

Communication with stakeholders was facilitated through the following means:

- ECC door knocked and conducted face-to-face meetings with the neighbours surrounding the development and key stakeholders 23rd – 24th May 2017 (Appendix D);

- A notification letter was sent via registered mail to the neighbors of the proposed development 6th July 2017 (Appendix D);
- Adverts were placed on ECC social media pages and three newspapers in accordance with the Environmental Management Act, 2007; notifying people how to register for the proposed project and inviting the public to the public meeting. This reached over 15,700 people, 100% post engagements were from Namibia;
- ECC held a public meeting on the 12th June 2017 to discuss the details of the project, it was extremely well attended with over 100 seats occupied (minutes and attendance register Appendix D);
- Additional face to face follow up meetings with stakeholders including Ministry of Fisheries and Marine Resources in Swakopmund, Namport, neighboring property businesses including The Raft, The Protea Hotel, the small businesses and tour operators on the Namport foreshore, consultation with the Walvis Bay Yacht club and ongoing consultation with potential project stakeholders occurred through the process;
- Public advertisements regarding the project were placed in three newspapers (Appendix D);
- Site notice erected (Appendix D);
- I&AP registration and compilation of the stakeholder database for the project. The I&AP registration form was also available on a web-based platform to allow a wider range of people to register and participate as an I&AP (Appendix D);
- Through the I&AP registration form, written formal comments were received from Sarah Goldsack (the Raft Restaurant) and Mike Yates (Appendix D);
- Meetings with Namport (Appendix D);
- Consultation with Ramsar (Appendix D); and
- Ministry engagements (Appendix D).

9.5 STAKEHOLDER NOTIFICATION

A BID was prepared and issued to the general public and stakeholders in June 2017 (see Appendix D). Although not a legal requirement, a BID is considered best practice. The purpose of the BID was to present an overview of the proposed project; the EIA process; the need for the proposed project; and any alternatives considered, with the aim to provide stakeholders an opportunity to register as an I&AP. The BID was the first stage of consultation, and as a result the register of I&APs was developed along with initial comments, questions and concerns (see Appendix D).

9.6 SOCIAL MEDIA ENGAGEMENT

The social media landscape is an important and powerful platform to incorporate important components of stakeholder engagement of the ESIA process and the overall proposed project, including publishing, sharing, discussing and networking. Social media has been used as a tool for stakeholder consultation, as it allows:

1. Communicating and providing stakeholders with opportunities to directly inform decision makers and receive immediate feedback.
2. Enabling efficient and cost-effective large-scale public participation.
3. Allowing greater adaptability during the stakeholder consultation process.
4. Providing broader participation by targeting interested and affected public, particularly youth.
5. Enhancing credibility by demonstrating open, fair and rigorous process.
6. Showing greater transparency by providing open and immediate access to information.

Advertisements for the public meeting posted on ECC social media page reached over 15,000 people with 100% audience engagement from Namibia (see Figure 66 and Figure 67).

Figure 66 – ECC Social Media Notifications of Public Meeting

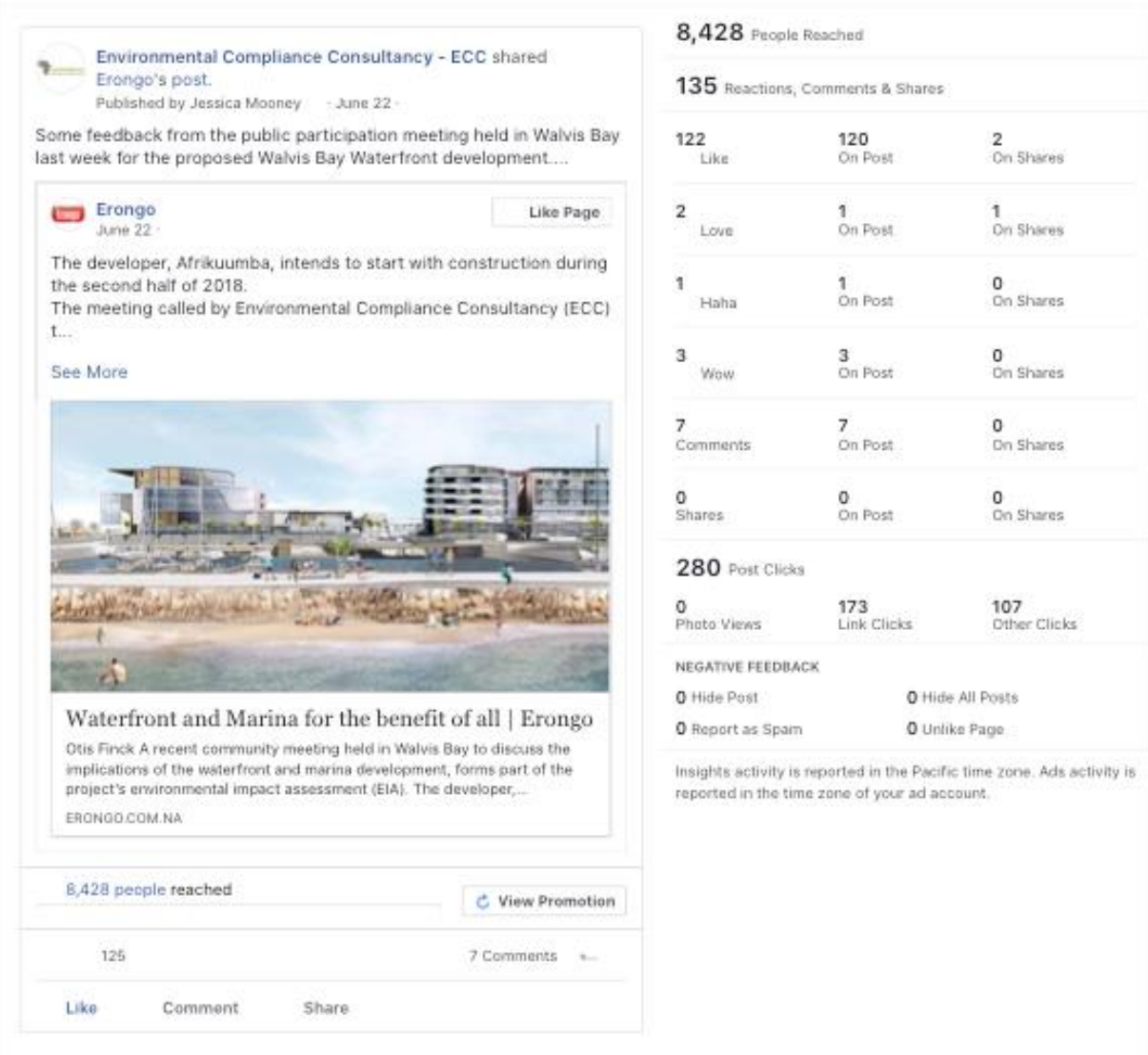


Figure 67 – ECC Social Media Feedback

The proposed project utilises Facebook as the key platform for social media engagement recognising the high proportion of Namibians using Facebook as a daily source of information. The proposed project's Facebook page has over 22,000 followers and is a practical, focused, participative and transparent platform for information gathering and sharing.

Where genuine participation was required to ensure the proposed project meets the community expectations and the project design incorporates the community needs, voting polls were established on Facebook. Opportunities to comment on preliminary designs and initial plans were invited, feedback and invitations seeking input were regularly maintained, resulting in a project that has strong community and stakeholder involvement.

The recreational sporting facilities and the relocation of these were identified as a key and critically important issue to the community. Several questions were posed to the community to better understand the community needs and desires in relation to the sporting facilities. An example of how social media has been used to engage the public is presented in Figure 68.

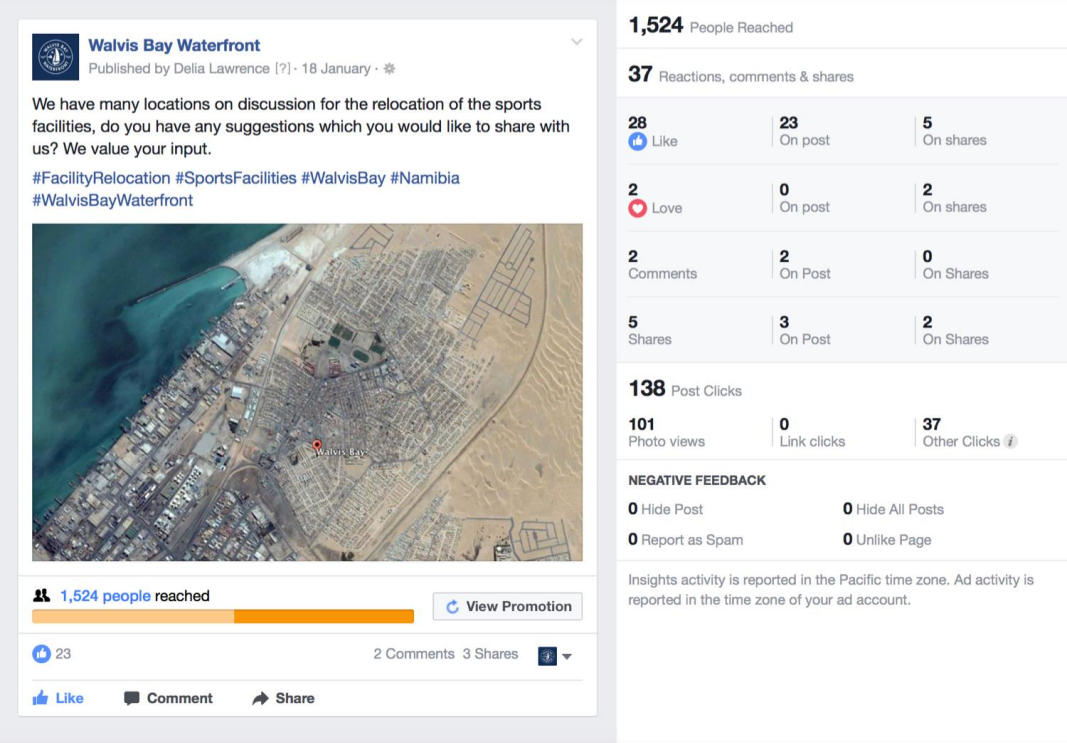


Figure 68 – Proponent seeking community input on relation of sports facilities

A series of questions and posts are presented in Figure 69 to Figure 72 in relation to the relocation of the swimming pool, to demonstrate the level of community engagement and feedback undertaken, and in turn the proponent's responses and inclusions in the proponents plans.

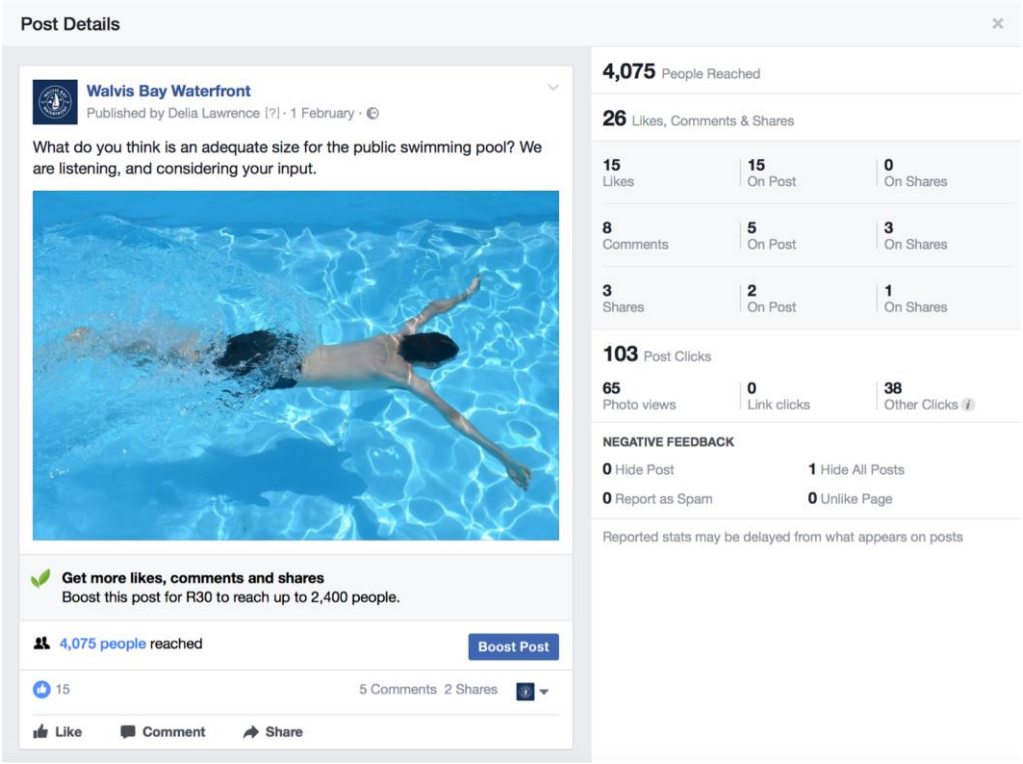


Figure 69 – Proponent seeking community input on size of swimming pool

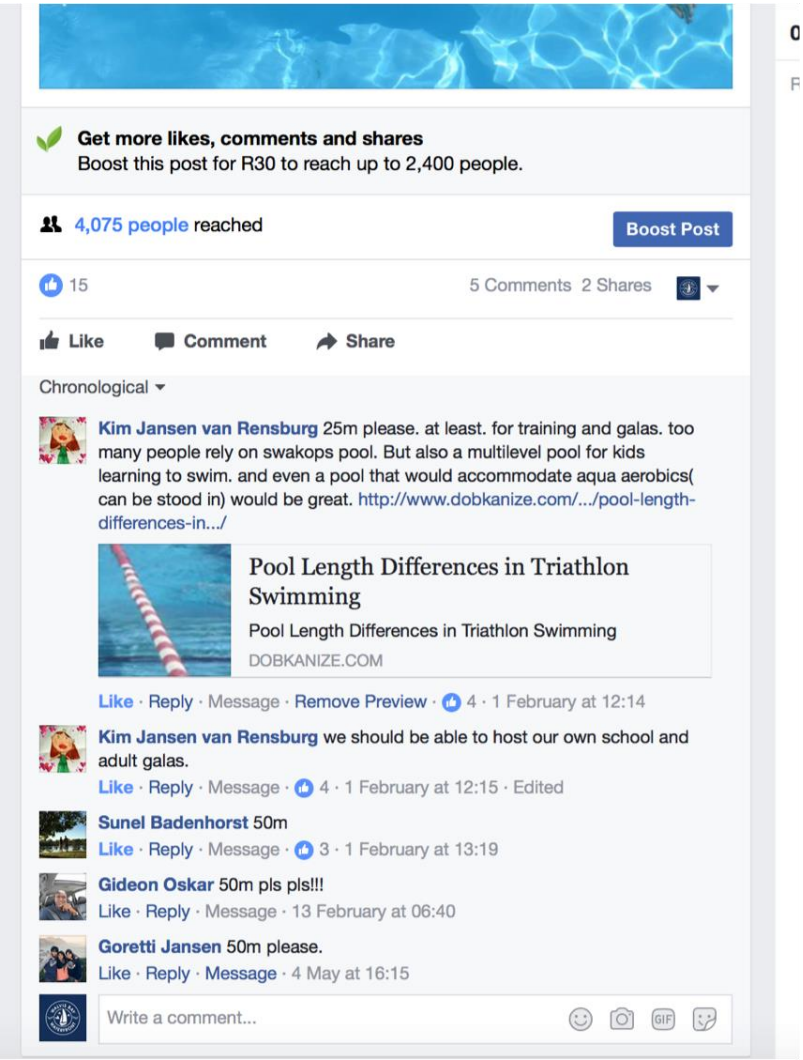


Figure 70 –Community feedback on size of swimming pool

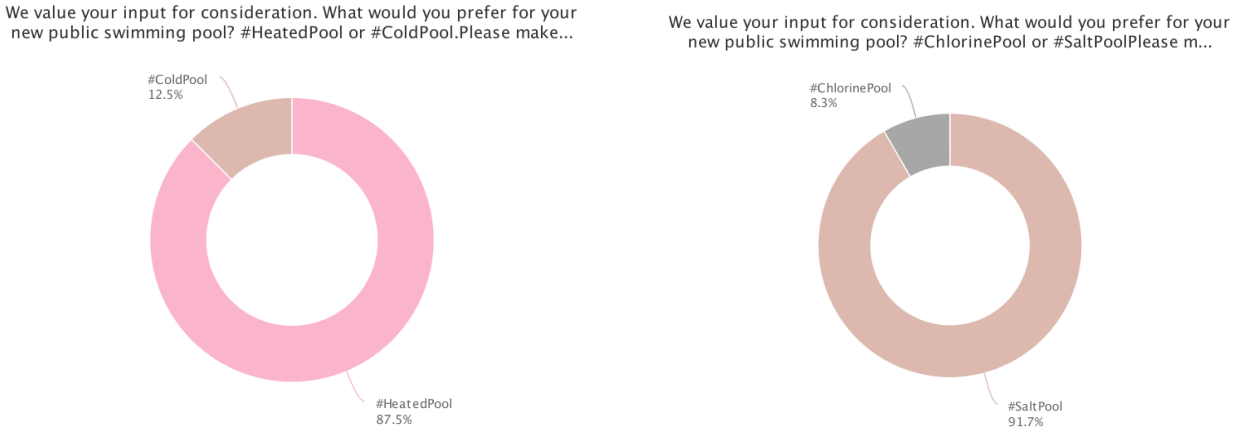


Figure 71 – Proponent seeking community input on swimming pool design

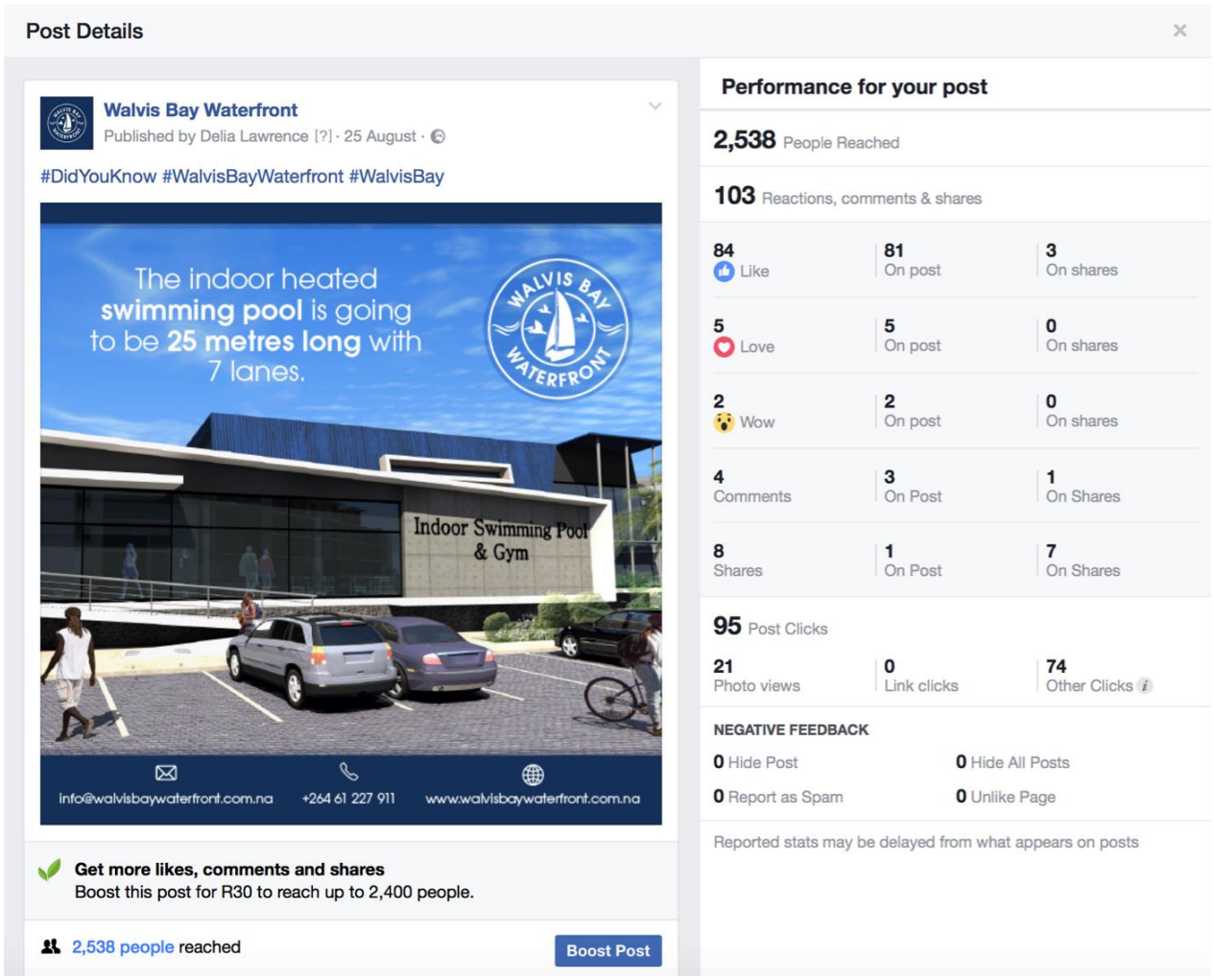


Figure 72 – Proponent response and plans incorporated community feedback

9.7 PUBLIC MEETING

A public meeting was held in Walvis Bay in order to discuss the environment and social impact assessment process, aims and objectives. The minutes of the meeting are in Appendix D.

9.8 CONSULTATION FEEDBACK 2017

Appendix D includes a register of all written questions, issues or concerns raised by stakeholders in 2017, through the stakeholder engagement process discussed in the previous sections. This feedback influenced the design of the proposed project (see Sections 4.5, 4.8 and 4.9.16), the ESIA process and subsequently enhanced the ESIA report. The last column in the register presents the location of where each I&AP question, issue or concern was addressed within the first revision of ESIA report.

9.9 CONSULTATION FEEDBACK 2018

This ESIA report was formally submitted to the relevant competent authorities, MET and I&APs on Monday 15th January 2018 for public and stakeholder comment. Comments received were collated in a register that is included in the accompanying Addendum Report. Each comment has been responded to, and where they were deemed to be material to the decision making or enhanced the ESIA, amendments were made to this ESIA report, with cross references in the collated register. Where substantial changes were made due to feedback, amended or new sections have been highlighted in the Addendum Report.

This ESIA report has been revised and the second revision has been issued to the MET and relevant competent stakeholders and I&APs to accompany the application for an Environmental Clearance Certificate.

9.10 FUTURE STAKEHOLDER ENGAGEMENT

To ensure the proposed project avoids and minimises environmental and social impacts during the construction and operations phase, continual engagement with the community and stakeholders will occur. This will be undertaken through the following forms:

- Advertising and community notices;
- Door to door knocking;
- Letter dropping and newsletters;
- Quarterly forums; and
- The Environmental and Social Manager managing a complaint's register, who will receive, respond to and action any complaints.

10 CONCLUSION

10.1 INTRODUCTION

This ESIA report presents the findings of an ESIA undertaken for the Walvis Bay Waterfront development proposed by the proponent 'Walvis Bay Waterfront Properties Pty Ltd'. The ESIA and this report have been undertaken in accordance with the requirements of the Environmental Management Act, 2007 (Act No. 7 of 2007) and the Environmental Impact Assessment Regulation, 2007 (No. 30 of 2011) gazetted under the Environmental Management Act, (EMA), 2007 (Act No. 7 of 2007).

Through the ESIA, a range of potential environmental and social impacts have been identified that may arise as a result of the construction, operation and decommissioning of a waterfront development, located on the Lagoon coastline in Walvis Bay. A range of mitigation and monitoring measures and arrangements have been identified to ensure the impacts are avoided or minimised as low as reasonably practicable.

Consultation has been undertaken throughout the design development of the proposed project and the ESIA process to ensure meaningful public and stakeholder participation has occurred in line with the EMA (2007) and associated regulations. Through means such as door to door knocking, postal letters, adverts, posters, public meeting, other face to face meetings, stakeholder meetings and continuous social media updates, the proposed project undertook stakeholder engagement that went over and above the requirements of the EMA (2007).

Through the stakeholder engagement process in 2017, I&APs provided feedback raising their questions, issues or concerns about the project. This feedback influenced the ESIA process and subsequently enhanced the ESIA report. Revision 1 of this ESIA report and associated appendices were formally issued to I&APs on January 15th 2018 for 21 days. All comments received from I&APs were collated in a register, and where comments were deemed to be material to the decision-making or enhanced the ESIA, amendments were made to this ESIA report and associated appendices.

10.2 ASSESSMENT FINDINGS

A summary of the findings is presented below and Table 44 provides a summary of the environmental and social issues that result in a moderate or major adverse impact, which are considered important factors in the decision making.

The Raft restaurant will likely be affected the most during the construction works due to the indirect impacts that will affect patrons visiting the restaurant. The construction of the Marina, in particular the breakwater wall will cause noisy and visually intrusive activities next to the restaurant. These impacts will most likely deter patrons from visiting the restaurant, but also affect their visit thereby reducing their stay. Mitigation measures such as a visual screen and technologies have been identified to minimise noise during construction works, however a reduction in revenue could occur during this time. Further engagement with the owners of the Raft Restaurant will continue to identify further mitigation measures or agreements to reduce the level of significance.

During construction, there is potential that tourists and the local community will not use the surrounding local businesses due to disruption and other construction impacts (e.g. noise, increase traffic and thus traffic disruption, and dust). This could result in a loss of revenue to some businesses. This impact however, would be for a short duration during the construction phase, and in the operational phase, local businesses are likely to see an increase in revenue due to an increase in the number of people frequenting the area.

A small section of Esplanade road will be permanently closed; however, this is unlikely to impact users as it is the end section of the road and alternative access routes are available. A new road through the proposed project site, Waterfront Drive, will also be developed. Pedestrian access routes will be integrated into the proposed project, allowing access up to the Protea Hotel, and potentially through to the existing waterfront.

The relocation of the sporting facilities will leave the local community without facilities for a short duration of time. However, these facilities will be replaced on a like for like basis elsewhere in the town, will be brand new and modern; an improvement from the existing facilities. A large open green space will be lost through the development of the proposed project, however open spaces have been integrated into the design of the proposed project, and alternative green spaces are available within 2km of the site.

There will likely be adverse impacts on the local residents as a result of construction activities. An increase in noise levels will occur, dust may arise, and there will be a presence of construction traffic. Even with appropriate mitigation, these impacts are likely to be the most cause of concern for local residents, and therefore appropriate community engagement will be undertaken for the duration of the construction works.

The presence of the proposed project would result in a change to the amenity, sense of place, and seascape and landscape characters of the area. Over time, local residents will become accustomed to the new environment, however some may not. The design of the proposed project has taken into consideration a range of factors to ensure the development integrates into the local environment, minimising environmental and social impacts.

Another concern, as expressed by many I&APs, is the potential impacts on the Lagoon and Ramsar site. Dedicated studies were undertaken, and the overall conclusions are that the proposed project may result in some short-term adverse impacts such as suspended solids, however this will not alter the integrity of the Ramsar site or the Lagoon's ecosystems, including the bird life. An increase in small recreational boats will occur, thereby increasing the potential risk of pollution and waste entering the marine environment and potentially disturb marine wild life; however strict marina rules and controls, and access to the Lagoon will not be allowed.

Marine mammals, in particular dolphins may be affected by the construction works and maintenance dredging through increased suspended solids, noise and vibration and impacts on their food sources. It is likely that they will avoid the areas during these short periods and will return due to the protection the Bay and Lagoon provides, and the available food sources. All construction works in the marine environment will be overseen by suitably qualified personnel to ensure marine mammals are not impacted.

Both the construction and operational phase will create a significant number of jobs (5000), resulting in various beneficial impacts such as increase in local economic activity, reduction in unemployment and increase in skills and training. House prices are expected to increase as a result of the presence of the proposed project and new bulk infrastructure will be provided, thereby improving the local sewerage and freshwater supply systems.

A summary of the environmental and social impacts, after mitigation, associated with the construction and operation of the proposed project is presented in

Table 44 and Table 45. These impacts are considered to be of significance or sensitive issues to the community, both beneficial and adverse.

Continual engagement will be undertaken with the community through the construction and operations of the proposed project. Through feedback and where possible, additional measures may be identified to reduce impacts.

Table 44 – Summary of the key adverse environmental and social issues

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact	Impact Management
Marina Construction - pile driving and dredging activities	– The Raft	Loss of patrons impacting the revenue of the Raft	Adverse Indirect Local Short Term Temporary and Reversible	Medium	Major	Adverse Major	Visual screen, type of technology: dredging and vibratory piling techniques, continual access, scheduling of activities.
Marina Construction – Impact on the structure and integrity	– The Raft	Closing of the restaurant resulting in loss of revenue	Adverse Indirect Local Short Term Temporary and Reversible	Medium	Major	Adverse Major	
Operations – increase in traffic	– Community – Residents	Change to traffic flows - increase in traffic volumes along KR Thomas Street and potentially 4th Road and other minor road, – affecting private access, increase collision risk and driver stress.	Adverse Indirect Local Medium-Term Irreversible	Medium	Moderate	Adverse Moderate	Traffic calming measures. Continual environmental monitoring.
Construction activities on site	– Community – Residents	Increased ambient noise levels – nuisance for local residents and sensitive receptors	Adverse Direct Local Short Term Reversible	Medium	Moderate	Adverse Moderate	Restricted hours, traffic management and calming measures, site boundary fence, scheduling of noisy construction activities, notice to residents prior to noisy activities.
Operations – activities on the proposed project site	– Community – Businesses – Residents	Impacts on sensitive receptors due to increased ambient noise levels - operations	Adverse Indirect Local Permanent Irreversible	Medium	Moderate	Adverse Moderate	Continual environmental monitoring.
Operations – increase in traffic	– Community – Businesses – Residents	Increased ambient noise levels – nuisance for sensitive receptors along transport route	Adverse Indirect Local Permanent Irreversible	Medium	Moderate	Adverse Moderate	Traffic calming measures and road upgrades. Continual environmental monitoring.

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact	Impact Management
Operations – new features	– Community – Businesses – Residents	Changes to the sense of place	Adverse Direct Local Long-Term Temporary	Medium	Major	Adverse Moderate	Design of the development – use of locally sourced natural material, integration of soft and hard landscaping, open green areas, buildings set back from the road.
Construction – general construction activities	– Community – Businesses – Residents	Neighbouring properties visual amenity (residential views) impacted by the construction site	Adverse Direct Local Permanent Irreversible	Medium	Moderate	Adverse Moderate	Site boundary fence, downward lighting.
Operations – new development	– Community – Businesses – Residents	Seascape and landscape altered due to new development.	Adverse Direct Local Long-term Permanent Irreversible	Medium	Moderate	Adverse Moderate	Design of the development – use of locally sourced natural material, integration of soft and hard landscaping, open green areas, buildings set back from the road.
Construction and operation	– RAMSAR Site	Integrity of the RAMSAR Site through reduced water quality of the Lagoon (increase sedimentation) and indirect impact on fish and bird populations.	Direct and indirect International Short-term Temporary Reversible	High	Minor	Adverse Moderate	Most appropriate dredger (sucking system) and piling (vibratory), removal of dredged material from marine environment, undertaking activities on outgoing tide, turbidity monitoring, use of a bund, silt curtain, sequencing and scheduling, soft starts or equipment in marine environment, well maintained and serviced equipment, all dredging over seen by suitable qualified person, continual twice-yearly bird monitoring and water quality monitoring.
Construction– dredging, piling and other noisy marine activities	– Marine Mammals	Noise from dredging activities, marine mammals not frequenting the area, reduction in numbers, impacts to tourists	Adverse Indirect Local Short Term Temporary Reversible	Medium	Moderate	Adverse Moderate	Scheduling of noisy construction activities, type of technology: dredging and vibratory piling techniques. Continual environmental monitoring.

Table 45 – Summary of the key beneficial environmental and social issues

Activity	Receptor	Impact	Nature of impact	Value & Sensitivity	Magnitude of change	Significance of impact
Operations	– Local tourism industry – Users of the Development – The Raft – Protea Hotel – Businesses around the sites	Increase in revenue through an increase in tourist numbers and local community visiting the waterfront	Beneficial Direct Regional Long Term Irreversible	Medium	Moderate	Beneficial Moderate
Construction works - general	– Community – Job seekers – Local economy	Creation of 500 jobs	Beneficial Direct Regional Short Term Reversible	High	Moderate	Beneficial Major
Operations of the proposed project	– Community – Job seekers – Local economy	Creation of 1700 – 1800 jobs	Beneficial Direct Regional Long Term Reversible	High	Moderate	Beneficial Major
Downstream job creation	– Community – Job seekers Local economy	Creation of 3,500 – 4,000	Beneficial Indirect Local Long Term Reversible	High	Moderate	Beneficial Major
Job creation	Community	Increase skills and training opportunities	Beneficial Indirect Local Long Term Reversible	High	Moderate	Beneficial Major
Operations	The Raft	Improved access and integration within the marina, increase tourists and patrons leading to an increase in revenue	Beneficial Indirect Local Long Term Irreversible	Medium	Major	Beneficial Major
Operations	Private property owner	Increase in property value	Beneficial Indirect Local Permanent Irreversible	Medium	Moderate	Beneficial Moderate
Installation of new bulk services	Service users	New and improved services	Beneficial Direct Local Long Term Irreversible	Medium	Moderate	Beneficial Moderate

10.3 Cumulative Impact Assessment Findings

A CIA was undertaken to identify intra-project and inter-project impacts:

- **Intra-project cumulative impacts:** Cumulative impacts that occur within the proposed project;
- **Inter-project cumulative impacts:** Cumulative impacts that occur as a result of the proposed project in combination with other projects, which is split in to two:
  - Cumulative impacts with existing projects; and
  - Cumulative impacts with future projects.

The CIA considered past, present and realistically defined future projects, which were identified through a desk-based investigation.

10.3.1 Intra-project Cumulative Impact Assessment Conclusions

The findings of the assessment of combined impacts and activities within the proposed project (intra-project cumulative impacts) found that the following receptors are likely to have moderate or major impacts:

- **The Raft Restaurant:** Potential loss of revenue;
- **Local residents and community**: Severance, increased noise and dust, change of residential views and local landscape/seascape character, change to sense of place, and temporary loss of sporting facilities.
- **The Ramsar Site:** Reduced water quality (increased sedimentation), reduced marine flora, changes to bird habitat, reduced food for birds and disturbance to birds (please note that the proposed project is not the responsible development for these potential impacts as discussed in the CIA above); and
- **Marine Mammals:** Potential loss of food source, marine noise levels, other disturbance and human-wild life interaction leading to mammals avoiding the area.

A precautionary assessment approach has been applied; therefore, with the application of best practice and additional mitigation measures, the predicted impacts may be less severe. Key mitigation will be the sequencing and scheduling of construction activities; type of dredging and piling techniques applied; dredging on the outgoing tide, applying soft starts to machinery and equipment; applying dust suppression techniques; and implementing traffic management and calming measures. In addition, a range of monitoring will be undertaken including but not limited to, water quality and noise monitoring. All mitigation measures and monitoring programme are detailed in the ESMPs in Appendix A.

10.3.2 Inter-project (Existing) Cumulative Impact Assessment Conclusions

Existing projects and activities that continue to affect shared environmental and social receptors with the proposed project are the Salt Works and associated evaporation ponds; fish factories; diversion weir on the Kuiseb river; Phase 1 of Namport's Container Expansion project; and tourism. The shared environmental and social receptors which are continually being influenced by anthropogenic influences and natural processes, and thus resulting in adverse changes, are the Lagoon's water quality and sedimentation rates, marine flora and fauna, the avian community, and the Ramsar site.

Whilst the proposed project could potentially contribute to the continual adverse changes of each of these receptors through various activities, the contribution is considered to be insignificant, and thus it is unlikely that the proposed project will be the responsible development for the incremental impacts.

10.3.3 INTER-PROJECT (FUTURE) CUMULATIVE IMPACT ASSESSMENT CONCLUSIONS

Through a desk-based review, six future projects were identified that could potentially have an impact on shared environmental or social receptors with the proposed project:

a. Walvis Bay South Port Terminal: Phase 1 of the Namport's Container Expansion project becoming operational;

b. Walvis Bay South Port Terminal: Construction and operation of both phases 2 and 3 of the Namport's Container Expansion project;

c. Namport's Waterfront and Marina;

d. Walvis Bay North Port Terminal;

e. Development of a hotel and casino on erven 4941; and

f. Lovers Hill development.

The following activities were identified that could potentially have an impact on shared environmental or social receptors as the proposed project: Increased population as well as tourists and visitors to the Walvis Bay area; and Increase in activities within the marine environment (tours, recreational boat users, sporting activities and fishing).

Projects c – f were not considered as realistically defined projects in accordance with IFC assessment guidance. A high level qualitative CIA was therefore undertaken which considered these projects in combination with the proposed project. Shared receptors that could potentially be impacted, and thus result in cumulative impacts are the community and the Ramsar site. Local residents surrounding the proposed project site could potentially be impacted by increased traffic volumes, increase in noise levels and a change to the local landscape. The features and attributes of the Ramsar site including the Lagoon environment (a fundamental component), could be impacted from various activities which could alter the water quality and avian life.

The magnitude of change, and nature and severity of impacts caused by the construction and operations of these four projects will determine the level of significance of the cumulative impacts on these receptors. This information is currently unknown; therefore, significance cannot be determined or suitable mitigation.

Phase 1 of the Namport's Container Expansion project is 76% complete and is expected to become operational in 2019. Phases 2 and 3 are unlikely to be constructed before 2025. An EIA was undertaken for the Namport Container Expansion project, and an Environmental Clearance was issued, therefore the Namport project is considered as a realistically defined project. The operations of phase 1, and construction and operations of phases 2 and 3 were assessed in the inter-project CIA.

The inter-project CIA illustrates that the proposed project would likely be responsible for the following incremental impacts:

- Avian community impacted from noise during operations: Minor cumulative impact;
- Local residents surrounding the proposed project site impacted through increased noise levels: Moderate cumulative impact; and
- Local residents surrounding the proposed project site impacted from change to local views and changes to landscape and seascape character: Moderate cumulative impact.

The increase in noise levels to residents surrounding the proposed project site would be felt during normal working hours which would be generated from Namport traffic, traffic to and from the proposed project (users of the development and staff) and a slight increase from operational activities on the proposed project site (day to day operations). These cumulative impacts are localised and various mitigation measures are in place to manage noise levels, such as designated routes to and from the proposed project site. The proponent will continually monitor the

changes to the baseline and there will be an Environmental and Sustainability Manager in place to manage concerns and potentially identify further controls where issues arise.

By the time phases 2 and 3 are constructed, the environmental and social baseline will have changed considerably in the area since Namport undertook their EIA study. Background noise levels are likely to increase as a result of the proposed project, and other contributors to the baseline noise may have altered their noise levels. Potential mitigation measures that Namport may implement to reduce noise levels are therefore unknown. Several recommendations associated with the Namport EIA have been made and listed in the following section.

Walvis Bay has a dynamic environment, which is constantly changing. Views, landscape and seascape character and sense of place will continue to change, and people will adapt to these changes. The impacts to local residents are expected to reduce over time, as people will be accustomed to the changes to their surroundings.

In addition to the above, it is concluded that the proposed project does not jeopardise the sustainability or integrity of the Lagoon environment and Ramsar site; the potential impacts arising from the proposed project are insignificant compared to other project and activities. It is acknowledged that the Lagoon environment is changing and could further be affected by other projects, therefore further collaborative work needs to be undertaken to ensure the Lagoon is protected holistically due to its value. A recommendation detailed below has been included.

The conclusions drawn from the CIA demonstrates that the proposed project may contribute to cumulative impacts, and in particular will result in localised cumulative impacts to receptors adjacent to the proposed project site. In a wider context, both temporally and spatially, the proposed project is unlikely to be the responsible development for significant incremental impacts, as the degree of this contribution to those impacts is considered to be marginal compared to other developments and activities in the area. It should be noted, that the wider cumulative impacts (not local) are expected to occur with or without the development of the proposed project.

10.3.4 RECOMMENDATIONS

Whilst undertaking this ESIA, various observations have been made, and as responsible environmental practitioners and proponent, recommendations have been proposed. These recommendations do not in any way have a bearing on or alter the findings of this ESIA; some may confirm findings or are required as part of the monitoring and management arrangements through the construction and operational phase. The main purpose of these are to illustrate there are environmental and social concerns that are bigger than this project and improvements can be made.

1. **Namibian Town and Regional Development Plans and CIA**

During the review of the Walvis Bay IUSDF, it was recognised there was an opportunity to improve the way in which development plans such as the IUSDF, are prepared. This improvement could include the provision for a comprehensive SEA with a supporting CIA for large-scale development plans in future. This will ensure cumulative impacts on potentially sensitive receptors are understood and determined at a strategic level and not reliant on being assessed on a project-by-project basis.

It is therefore recommended that Strategic CIAs be undertaken in future, for all strategic development plans and when revisions of development plans occur to ensure the environment and social cumulative impacts are understood and considered in the National and Regional development framework and plans.

The IFC assessment guidance (International Finance Corporation, 2013), which is part of the World Bank states that it is the Government and regional planners that have the ultimate responsibility of this level of CIA.

It is also recommended that any future developments (planned or unplanned in the IUSDF) in Walvis Bay undertake a robust CIA as part of their EIA (similar to that applied and conducted for this CIA in line with IFC standards).

2. CIA for the Ramsar site

The draft Wetland Policy for Namibia (Ministry of Environment and Tourism , 2004) sets out the threats to Namibia's wetlands, presents goals and objectives, and details the need for partnerships and co-operation for the management and protection of Namibia's wetlands. The SEA for the Coastal area of Erongo and Kunene Regions (DHI Water & Environment, 2007) also recognises there is a weak structure for the protection of Namibia's wetlands. One of the recommendation in this report was: *'MET, the Walvis Bay Municipality and the Coastal Environmental Trust of Namibia should as soon as possible establish a long-term environmental monitoring programme including the biodiversity elements for terrestrial, coastal as well as offshore habitats found in the wetland. A baseline for the monitoring programme should produce diversity gradients in relation to tourism, aquaculture and agriculture and the acquired data should feed into the requirement for improved Environmental Impact Assessments.'*

As part of the above commitments it is recommended that a detailed CIA should be undertaken to support the policy and management plans. The purpose of undertaking a CIA would not only meet the policy goals and objectives, it would take the extra step of defining environmental quality objectives and thresholds for various attributes of the Ramsar site. This will be used to inform the parameters of future development and steer development that interacts with the Ramsar site in a sustainable direction.

ECC recommends that this is completed prior to any future development which is likely to cause significant effects on the Lagoon or other features of Ramsar site (please note, this project is not likely to cause any significant effects on the marine environment, and a detailed CIA has been completed for the project in this report). Therefore, this recommendation should not alter the ability for the regulating authority to issue an environmental clearance certificate for the proposed project. This recommendation is made solely on the basis of improving future EIAs that might not be completed with the same level of attention and assessment that has been applied to this ESIA.

3. Namport Container Expansion project EIA

During the ESIA process and in particular during the CIA, it was recognised that various impacts are associated with the Namport project, some impacts were not expected, and some impacts are considered to be more significant that what was predicted. The lack of sediment plume modelling for the construction of phases 2 and 3, as well as the lack of a CIA in the Namport EIA limited the CIA undertaken in this EISA, however it is acknowledged that the Namport EIA was undertaken prior to the EIA Regulations (2012).

The baseline data collected for the Namport EIA was undertaken prior to 2012. By the time phases 2 and 3 commence construction (not before 2025 when phase 1 reaches capacity), the baseline data will be more than 13 years old. During this period the baseline could have changed considerably, including the development of the proposed project. In addition, Namport's operations and activities that are undertaken within the marine environment and on-land have altered considerably over the years.

One of the recommendations in the Namport EIA was to undertake monitoring of the suspended sediment concentrations during dredging and reclamation. This data has not been made available for the ESIA undertaken for the proposed project, however it is assumed it will be made available in the future and therefore it should be used for future assessments for other projects, in particular phases 2 and 3 of the Namport Container Expansion project.

Based on the above points, it is therefore recommended that prior to the second and third phases of the Namport project progressing, additional work to strengthen their existing EIA should be undertaken. This should include a robust and detailed CIA. Furthermore, construction of phases 2 and 3 should be dependent on ability to demonstrate compliance with conditions set for Phase 1. This recommendation is made on the basis that the consultant, the proponent and many of the I&AP for this project expressed concern for the lagoon as a result of the Namport construction project. It is apparent that further work is required to address these concerns.

4. **Environmental monitoring**

In relation to the above recommendations, **it is recommended that collaborative environmental monitoring between the Municipality, Namport, the proposed project proponent and other key stakeholders and developers should be undertaken.**

10.4 Final Remarks

Taking into consideration the potential adverse impacts, mitigation measures and the potential beneficial impacts, ECC believes the benefits of the proposed project outweigh any potential negatives, and the proposed project will contribute to the sustainable development of Walvis Bay, in line with the Walvis Bay IUSDF and relevant National development plans.

The implementation of the ESMPs and associated programme of environmental protection as an outcome of the impact assessment process would serve to minimise the impacts and risks associated with the proposed project to an environmental and socially acceptable standard. **An Environmental Clearance Certificate could be issued, on condition that the management and mitigation measures in the ESMP are adhered to.**

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APPENDIX A: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLANS

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