OPERATIONS OF THE WALVIS BAY INTERNATIONAL AIRPORT

ENVIRONMENTAL MANAGEMENT PLAN

Prepared by:

Prepared for:

NAMIBIA AIRPORTS COMPANY

August 2025

Project:	**OPERATIONS OF THE WALVIS BAY INTERNATIONAL AIRPORT: ENVIRONMENTAL MANAGEMENT PLAN**	
Report: Version/Date:	Draft August 2025	
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Report Approval	**Pierre Botha** Managing Director	

I GERSON ADOLF BISEN UIRAB acting as the Proponent's representative (Namibia Airports Company Ltd), hereby approve this report and confirm that the project description contained in herein is a true reflection of the information which the Proponent has provided to Geo Pollution Technologies. All material information in the possession of the Proponent that reasonably has or may have the potential of influencing any decision or the objectivity of this assessment is fairly represented in this report.

Signed at Windhoek on the 20th day of August 2025.

Namibia Airports Company Ltd

98/492
Company Registration No.

EXECUTIVE SUMMARY

Namibia Airports Company Ltd requested Geo Pollution Technologies (Pty) Ltd to prepare an environmental management plan (EMP) for the existing operations of the Walvis Bay International Airport. The airport is situated on the western fringes of the Walvis Bay Local Authority area. Operations at the airport include managing passenger services, ground handling, security, and air traffic control, as well as all support services required for such operations. Related services include the management of liquid, solid, and hazardous waste from on-site operations and airlines, refuelling of aircraft and fleet vehicles.

The EMP is conducted to determine all environmental, safety, health and socio-economic impacts associated with the operations of the airport. Relevant environmental data was compiled by making use of secondary data and from a reconnaissance site visit. Potential environmental impacts and associated social impacts were identified and are addressed in this report.

Due to the nature and location of the facility, impacts can be expected on the surrounding environment. Impacts are mostly medium to low before any preventative and mitigation measures are implemented. These are summarised in the section 7 below. The location of the airport is well established and is managed by the Namibian Airports Company Limited, which functions autonomously under a board of directors, appointed by the Minister of Works and Transport, in its capacity as the portfolio Minister. Surrounding land use is identified as the Rooikop Military Base and vacant land earmarked for future development that is zoned for heavy industrial use, with the Namib-Naukluft National Park to the east.

The major concerns related to the operations of the airport are that of surface water and soil contamination, possibility of fire and the health risk of foreign waste from airliners. This will however be limited by adherence to regulations from the Namibia Civil Aviation Authority, International Civil Aviation Organization (ICAO), World Health Organization and the World Bank. Furthermore, noise levels should comply with health and safety regulations outlined in the Labour Act/or World Health Organizations standards for community noise as well the ICAO guidelines on the balanced approach to aircraft noise management. Noise issues are likely to increase as development around the airport takes place, leading to an increase in receptors. It is recommended that environmental performance and air quality be monitored regularly to ensure regulatory compliance and that corrective measures be taken if necessary.

It can be concluded that expected impacts can be managed through the required preventative and mitigating measures. As such, the continued operations should not have a significant impact on the environment if the management plan is implemented and adhered to. By appointing local contractors and employees and implementing educational programs the positive socio-economic impacts of the project can be maximised while mitigating any negative impacts.

The EMP included in Section 7 of this document, should be used as an on-site reference document during all phases (planning, maintenance, operations and decommissioning) of the airport. All monitoring and records kept, should be included in a report to ensure compliance with the EMP. Parties responsible for transgression of the environmental management plan should be held responsible for any rehabilitation that may need to be undertaken. A Health, Safety, Environment and Quality policy should be used in conjunction with the EMP. Operators and responsible personnel must be taught the contents of these documents. Municipal or national regulations and guidelines must be adhered to and monitored regularly as outlined in the EMP.

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LIST OF ABBREVIATIONS

ACI	Airports Council International
AIDS	Acquired Immune Deficiency Syndrome
EIA	Environmental Impact Assessment
EMA	Environmental Management Act No 7 of 2007
EMP	Environmental Management Plan
EMS	Environmental Management System
GPT	Geo Pollution Technologies
HIV	Human Immunodeficiency Virus
IAEA	International Atomic Energy Agency
IAPs	Interested and Affected Parties
IBA	Important Bird Area
ICAO	International Civil Aviation Organization
IUCN	International Union for Conservation of Nature
kVA	Kilovolt-ampere
LAQ	Local Air Quality
m/s	Metre per second
mamsl	Metres above mean sea level
MBL	Marine Atmospheric Boundary Layer
mbs	Metres below surface
MEFT	Ministry of Environment, Forestry, and Tourism
mm/a	Millimetres per annum
MSDS	Material Safety Data Sheet
NAC	Namibia Airports Company
PPE	Personal Protective Equipment
RPM	Radiation Management Plan
SAH	South Atlantic High
SANS	South African National Standards
UNFCCC	United Nations Framework Convention on Climate Change
WHO	World Health Organization

GLOSSARY OF TERMS

Alternatives - A possible course of action, in place of another, that would meet the same purpose and need but which would avoid or minimize negative impacts or enhance project benefits. These can include alternative locations/sites, routes, layouts, processes, designs, schedules and/or inputs. The "no-go" alternative constitutes the 'without project' option and provides a benchmark against which to evaluate changes; development should result in net benefit to society and should avoid undesirable negative impacts.

Assessment - The process of collecting, organising, analysing, interpreting and communicating information relevant to decision making.

Competent Authority - Means a body or person empowered under the local authorities act or Environmental Management Act to enforce the rule of law.

Construction - Means the building, erection or modification of a facility, structure or infrastructure that is necessary for the undertaking of an activity, including the modification, alteration, upgrading or decommissioning of such facility, structure or infrastructure.

Cumulative Impacts - In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Environment - As defined in the Environmental Assessment Policy and Environmental Management Act - "land, water and air; all organic and inorganic matter and living organisms as well as biological diversity; the interacting natural systems that include components referred to in sub-paragraphs, the human environment insofar as it represents archaeological, aesthetic, cultural, historic, economic, palaeontological or social values".

Environmental Impact Assessment (EIA) - Process of assessment of the effects of a development on the environment.

Environmental Management Plan (EMP) - A working document on environmental and socio-economic mitigation measures, which must be implemented by several responsible parties during all the phases of the proposed project.

Environmental Management System (EMS) - An Environment Management System, or EMS, is a comprehensive approach to managing environmental issues, integrating environment-oriented thinking into every aspect of business management. An EMS ensures environmental considerations are a priority, along with other concerns such as costs, product quality, investments, productivity and strategic planning. An EMS generally makes a positive impact on a company's bottom line. It increases efficiency and focuses on customer needs and marketplace conditions, improving both the company's financial and environmental performance. By using an EMS to convert environmental problems into commercial opportunities, companies usually become more competitive.

Evaluation - Means the process of ascertaining the relative importance or significance of information, the light of people's values, preference and judgements in order to make a decision.

Hazard - Anything that has the potential to cause damage to life, property and/or the environment. The hazard of a particular material or installation is constant; that is, it would present the same hazard wherever it was present.

Interested and Affected Party (IAP) - Any person, group of persons or organisation interested in, or affected by an activity; and any organ of state that may have jurisdiction over any aspect of the activity.

Mitigate - The implementation of practical measures to reduce adverse impacts.

Proponent (Applicant) - Any person who has submitted or intends to submit an application for an authorisation, as legislated by the Environmental Management Act no. 7 of 2007, to undertake an

activity or activities identified as a listed activity or listed activities; or in any other notice published by the Minister or Ministry of Forestry, Environment & Tourism.

Public - Citizens who have diverse cultural, educational, political and socio-economic characteristics. The public is not a homogeneous and unified group of people with a set of agreed common interests and aims. There is no single public. There are a number of publics, some of whom may emerge at any time during the process depending on their particular concerns and the issues involved.

Scoping Process - Process of identifying: issues that will be relevant for consideration of the application; the potential environmental impacts of the proposed activity; and alternatives to the proposed activity that are feasible and reasonable.

Significant Effect/Impact - Means an impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

Stakeholder Engagement - The process of engagement between stakeholders (the Proponent, authorities and IAPs) during the planning, assessment, implementation and/or management of proposals or activities. The level of stakeholder engagement varies depending on the nature of the proposal or activity as well as the level of commitment by stakeholders to the process. Stakeholder engagement can therefore be described by a spectrum or continuum of increasing levels of engagement in the decision-making process. The term is considered to be more appropriate than the term "public participation".

Stakeholders - A sub-group of the public whose interests may be positively or negatively affected by a proposal or activity and/or who are concerned with a proposal or activity and its consequences. The term therefore includes the Proponent, authorities (both the lead authority and other authorities) and all interested and affected parties (IAPs). The principle that environmental consultants and stakeholder engagement practitioners should be independent and unbiased excludes these groups from being considered stakeholders.

Sustainable Development - "Development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs and aspirations" – the definition of the World Commission on Environment and Development (1987). "Improving the quality of human life while living within the carrying capacity of supporting ecosystems" – the definition given in a publication called "Caring for the Earth: A Strategy for Sustainable Living" by the International Union for Conservation of Nature (IUCN), the United Nations Environment Programme and the World Wide Fund for Nature (1991).

1 BACKGROUND AND INTRODUCTION

Geo Pollution Technologies (Pty) Ltd was appointed by the Namibia Airports Company Ltd (the Proponent) to prepare an environmental management plan (EMP) for the operations and possible future decommissioning of the Walvis Bay International Airport. The airport is located approximately 15 km east of the Walvis Bay central business area, adjacent to the C14 road (Figure 1-1). Initial infrastructure at the airport was established during the Second World War. Over the following decades, the facility was developed and expanded, with the site being used primarily for military purposes until 1994. Civilian and commercial flight operations began in the late 1950s, with airlines such as South West Air Transport (later Air Namibia) providing passenger services. It has been continuously operational since then, with the Namibia Airports Company (NAC) currently managing its operations. The main, existing airport operations include:

- Air traffic control for take-off and landing of aircraft,
- Administration and management of passenger and crew services,
- Cargo and baggage handling,
- Waste management (aircraft and on-site related);
- Fuel storage and refuelling (outsourced);
- Firefighting facilities and training;
- Maintenance of service and infrastructure components;
- Birdlife and wildlife management.

The EMP is prepared in order to apply for an environmental clearance certificate in compliance with Namibia's Environmental Management Act (Act No 7 of 2007).

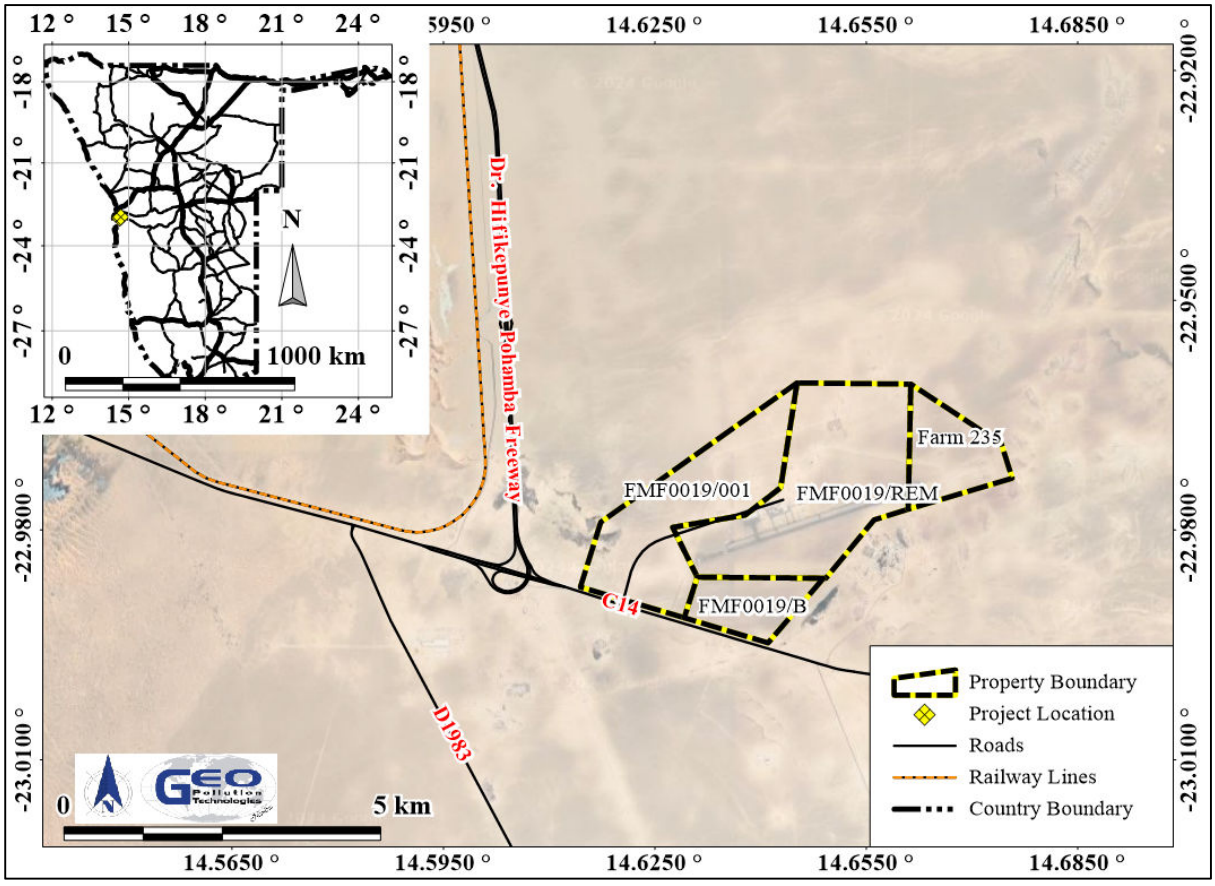


Figure 1-1 Project location

Project Justification – Walvis Bay International Airport is the main airport servicing the larger commercial centres along the central coast of Namibia. As the only commercial and international airport in a 300 km radius, it provides a direct, international link for passengers and cargo to Swakopmund and

Walvis Bay. The Airport also affords a convenient link for in-country travel to the coast. An essential economic driver, the Airport facilitates the rapid movement of goods and people and increases trade and commerce to the area. In addition, it provides a service to time-sensitive delivery of goods, for example such as seafood, samples or certain pharmaceutical/medical resources.

Benefits of the Walvis Bay International Airport include:

- Reliable and efficient gateway for local and international travellers/visitors;
- Important marine vessel crew change opportunities;
- Dependable transport node for the movement of goods and services;
- Increased domestic, regional and international flights will contribute to the Namibian economy;
- Employment and skills training;
- Support for potential additional investments and development in Namibia;
- Support for businesses and the tourism sector operating in Namibia.

2 SCOPE

The scope of this report is to:

1. Determine the potential environmental impacts emanating from the operational and decommissioning activities of the airport;
2. Identify a range of management actions which could mitigate the potential adverse impacts to acceptable levels;
3. Provide sufficient information to the Ministry of Environment, Forestry and Tourism (MEFT) to make an informed decision regarding the operational and decommissioning activities of the airport.

3 EXISTING AND FUTURE AIRPORT OPERATIONS

The existing and planned operations of the airport include passenger and baggage processing, cargo handling (including perishable goods such as seafood), waste management (liquid, solid, and hazardous waste from aircraft and airport operations), general administration, firefighting services and related training, surface runoff, noise, and wildlife control. In 2023, Walvis Bay International Airport handled approximately 80,000 passengers, reflecting a strong recovery in air travel following the COVID-19 pandemic. This marked a significant increase compared to 2022, with monthly passenger arrivals rising by up to 49% year-on-year in some months. The airport accounted for around 10% of Namibia's total air passenger traffic, making it the country's second-busiest airport after Hosea Kutako International Airport (Namibia Airports Company, 2024; Namibia Statistics Agency, 2024; The Brief, 2024; Business Express, 2024). To maintain reliable and efficient operations, the airport must complies with all relevant Namibian legislation and regulations, as well as the standards and recommended practices of the ICAO and ACI.

The operational components of the airport may broadly be grouped according to the following categories:

- Airside operations - relates to all activities within a secured airport area connected to aircraft movement, ground handling, and related or support services. This includes amongst others the runway, taxiways, aprons, and aircraft parking areas. The management of ground services and the coordination of aircraft movement are vital, active operational activities to ensure overall safety and compliance to regulatory procedures.
- Landside operations - refers to a broad range of activities focused on the passenger experience and the management of airport assets that are accessible to the public. This includes everything from the terminals to the open spaces and extends to roadways and properties surrounding the airport. Typical operations also includes aspects such as the coordination of buses, taxis, and other forms of ground transportation that connect passengers to and from the airport; surveillance and patrol operations within the passenger buildings and parking areas; and management of parking areas and related facilities.

The interface between the landside and airside often relates to security procedures. Key activities are the processing of departing and arriving passengers and the handling of baggage and cargo. All other activities are support services to enable the key activities. Passenger departures involve checking in of passengers, passenger security checks, scanning of baggage with x-ray machines, and passport control. Passengers awaiting departure are serviced by a number of shops, restaurants, baggage wrapping, banking facilities and so forth. These facilities are typically outsourced to third party tenants. Arriving passengers proceed through passport control, baggage collection and customs, after which they can also visit shops, banks, and other amenities. Customs checks also make use of x-ray scanning of luggage and searching of persons for contraband.

Currently x-ray machines used at the airport are for baggage scanning and uses ionizing radiation to create detailed images of the contents inside bags. When luggage passes through the machine on a conveyor belt, a beam of x-rays penetrates the bag and captures varying levels of absorption depending on the density and material of the objects inside. This allows security personnel to identify prohibited items such as weapons, explosives, or liquids. Non-ionizing radiation (such as electromagnetic waves) is typically used in metal detector-body scanners to detect concealed items on passengers.

Airside and landside operations also include wildlife management to reduce bird and animal collision risks. These operations contribute to, or are reliant on combined infrastructure and services which require continuous management. The most pertinent of these being fuel-, power- and water supply, waste management and emergency services. These services are typically those, which may have the most pertinent environmental risks.

No night operations, outside of natural light hours, are currently part of normal operations at the Walvis Bay International Airport.

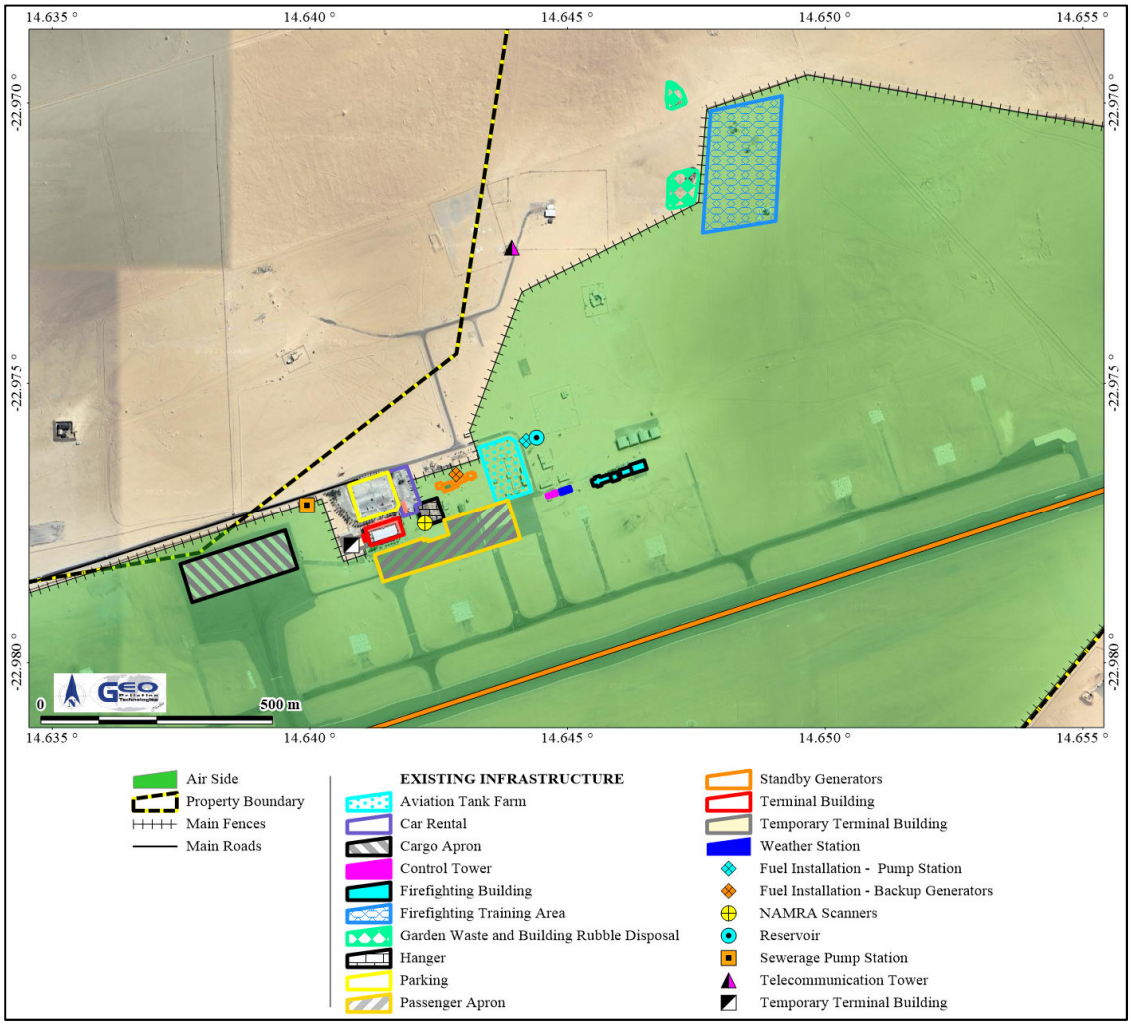


Figure 3-1 Existing main airport infrastructure

3.1 EXISTING AIRPORT INFRASTRUCTURE OPERATIONS AND MANAGEMENT

The main airport infrastructure components are summarised below.

3.1.1 Runway, Aprons and Taxiways

The Walvis Bay International Airport has one runway of 3,440 m, located south of the main terminal building. The runway, which is 60 m wide, is appropriately marked and lighted while Bing fitted with stop bars. From the runway, taxiways extend north towards the passenger and cargo aprons. The runway, taxiways and aprons are all surfaced with a combination of asphalt and concrete. Continuous management of these surfaces and surrounding reserves are overseen by the Proponent. Management activities extend beyond routine maintenance to include essential airside functions such as wildlife management to mitigate bird strikes and runway management to ensure surface integrity and safety. These activities are integral to maintaining safe aircraft operations and complying with aviation safety standards.

The separation distance between the runway and parallel taxiway does not allow simultaneous movement of landing and taxiing aircraft, which needs to be controlled by the air traffic controllers.

Removal of disabled aircraft is the responsibility of the airline or registered owner or aircraft operator The Walvis Bay International Airport has limited equipment for light aircraft removal while the removal of medium to large aircraft, equipment may be sourced as per the emergency management response plan when required. The aircraft operator is obliged to remove disabled aircraft from the manoeuvring area within agreed time frames.

3.1.2 Fuel Storage and Refuelling

The main aviation fuel storage facility is operated by an independent third party, located within a fenced off area inside the airside area. Multiple underground steel storage tanks designated for AVGAS and Jet A-1 fuel is present. Deliver to this facility is exclusively by road tanker. The facility is responsible for storing and distributing the required aviation fuel for airport operations. All fuel handling, including storage, quality control, and distribution to the airport, is managed by the third-party operator.

Aircraft refuelling at the airport is carried out using specialised bowser trucks, which are filled at the storage facility before servicing aircraft on the apron. The storage and distribution systems incorporate standard pumps, filtration equipment, and safety devices to ensure compliance with international aviation fuel quality and safety standards.

3.1.3 Firefighting and Emergency Infrastructure

The main firefighting building is the last and most eastern permanent building structure located north of the runway and south of the private hangars. Firefighting equipment include one Rosenbauer Panther 6x6 fire fighting vehicle (Rescue 1) and one Marce Rhino 6x6 fire fighting vehicle (Rescue 2). The extinguishing media carried (excluding reserves) consist of 25 m^3 of water, 3,000 m^3 of foam concentrate, and 500 kilograms of dry chemical powder. The total foam solution discharge rates are 9 m^3 per minute for Rescue 1 and 5,000 m^3 per minute for Rescue 2. Reserve extinguishing media include a 200% aqueous film forming foam and a water reservoir with a capacity of 760 m^3, supported by six strategically located fire hydrants throughout the airport.

Regular firefighting drills are conducted on site, focusing primarily on simulated aircraft fire scenarios. These exercises mainly take place in the firefighting training area located in the northern corner of the airport property (Figure 3-1).

The use of per- and polyfluoroalkyl substances in firefighting foams are discouraged where possible due to environmental concerns. In cases where their use is unavoidable, a comprehensive monitoring program must be implemented to assess and mitigate any potential environmental impacts.

Photo 3-1 Firefighting building

Photo 3-2 Firefighting vehicles

Photo 3-3 Firefighting training area

Photo 3-4 Firefighting training infrastructure

Photo 3-5 Fuel storage for training with staining

Photo 3-6 Leaking fuel storage for training

3.1.4 Terminal Building

A terminal building is located north of the passenger apron and east of the cargo apron. It serves to facilitated immigration and administration processes at the airport while also accommodating offices for related services. Dedicated baggage handling areas are separated from the main departure and arrival halls. Security services are operational for 24 hours of the day. Car rental agencies and the public parking area is located north of the main terminal building.

Photo 3-7 Passenger Apron and fire hydrant

Photo 3-8 Terminal building

3.1.5 Water Supply

All water for airport operations is sourced from NamWater through a water supply line that also serves the Rooikop Military Base. The pipeline feeds a main water reservoir (Photo 3-9), from where water is pumped through a network of pipes. A backup diesel driven pumps with adjacent fuel storage is present at the water reservoir to ensure efficient water supply during power outages. A dedicated fire-hydrant line, linked to the water reservoir, is present on site and supplies numerous fire hydrants located around the main infrastructure components of the airport. The diesel storage tank is within a suitable bund area (Photo 3-10). This tank is supplied via road tankers.

3.1.6 Power Supply

All electricity needs at the airport is met via an underground powerline connected to ErongoRED. Step-down transformers are installed to provide appropriate voltage levels to the various operational areas. Two 400 kVA backup diesel generators (Photo 3-11) and an associated diesel storage tank (Photo 3-12) is present to ensure efficient power supply during power supply outages. The diesel storage tank is within a suitable bund area (Photo 3-12). This tank is supplied via road tankers.

Photo 3-9 Water reservoir and pump room

Photo 3-10 Water pump fuel storage

Photo 3-11 Backup generator room with small diesel spill

Photo 3-12 Diesel tank for backup generators

3.1.7 Sewage and Wastewater Management

All sewage and wastewater generated within the airport, is treated at an off-site treatment plant, which is management and operated by the Ministry of Works and Transport. Sewage and wastewater enter a combined main (pipeline) system which pumps to this plant, located southeast of the airport.

All sewage and wastewater from aircraft is pumped into trucks and offloaded into a sewerage manhole from where it also flows to the treatment plant. Operational management focusses on the maintenance of the main pipeline and all connecting service points (such as manholes, toilets). No wastewater or sewage is disposed of on site. During contract work, existing facilities are made available to contractors, and where not feasible, chemical toilets are provided.

3.1.8 Waste Management

Numerous waste streams are present within the airport and can generally be classified into recyclables, biological, hazardous, dangerous and general waste. The main sources areas include, but are not limited to the following:

- Offices and administrative - including broken / redundant equipment like x-ray machines, computers, printers and related waste.
- Restaurants and catering - from airport buildings and aircrafts and includes leftover food, tins, wrapping, bottles and similar waste.
- General airport maintenance - rubble, paint, dismantled infrastructure and equipment and infrastructure that became obsolete.
- Aircraft and vehicle maintenance - including oils, lubricants, hydraulic fluid and related waste.
- Property maintenance - garden and other pruned or removed vegetation and rubble.
- Waste related to car rental firms on the premises.

Waste at the Walvis Bay International Airport is managed through a combination of aboveground wheelie bins and designated waste collection points located throughout the airport premises. The majority of waste generated is deposited in these bins, which are regularly collected by an approved waste management contractor and transported to a licensed municipal landfill. Where practical, recyclables and general waste are separated at source.

Garden refuse, typically trimmings of palm trees on site, as well as building rubble are disposed of at an onsite area specifically designated for such materials, as identified in the airport's environmental management plan. These sites are temporary sites and the material is regularly removed from there. Hazardous waste, such as used oil, contaminated fuel, and spill clean-up materials, is securely stored in a dedicated holding area before being collected by licensed third-party contractors, for either recycling or safe disposal at the Walvis Bay municipal landfill.

Photo 3-13 Garden refuse disposal

Photo 3-14 Windblown waste caught in the boundary fence

3.1.9 Emergency Chemical Storage

An emergency chemical storage building (Photo 3-15 is present in which chemicals that need storage during emergency situations can be stored.

Photo 3-15 Emergency chemical storage

3.1.10 Additional Infrastructure

Other infrastructure and buildings located within the airport property, include the air traffic control tower, hangar space, telecommunication tower and repair sheds and yards. The temporary terminal buildings have been decommissioned and have been earmarked for removal. All chemicals for general and emergencies are stored with appropriate access restrictions and in compliance with safety regulations to prevent unauthorized use or environmental contamination.

Photo 3-16 Private hanger

Photo 3-17 Passenger apron

3.1.11 Obsolete Infrastructure

The site at Walvis Bay International Airport includes a number of old and abandoned structures dating from its earlier use as a military air base and from previous phases of airport

operation. With the completion of major upgrades in recent years, several elements of the old infrastructure are no longer in use.

Some of the outdated buildings such as redundant hangars, storage sheds, and auxiliary service rooms are earmarked for demolition. These structures no longer meet current safety or operational standards and their removal will facilitate more efficient use of space and improve overall site safety. The presence of asbestos in the building material should be checked for prior to demolition as some of the structures might date back to times when asbestos material was used for construction.

Infrastructure that is neither fit for continued use nor suitable for repurposing, is scheduled for decommissioning. Once safely decommissioned, items such as old vehicles, equipment, and salvageable materials may be auctioned off to recover value and reduce waste.

Photo 3-18 Decommissioned warehouse

Photo 3-19 Decommissioned service warehouse

Photo 3-20 Old firefighting warehouse with unused fuel storage tank

Photo 3-21 Old firefighting truck earmarked for auction

4 ALTERNATIVES

The facility is existing and has been operational since the late 1950s, originally serving as a military air base before transitioning to civilian and commercial use. As a result, no alternative location is proposed, since relocating the airport would require substantial capital investment and will likely then impact on virgin ground. From an environmental perspective, the assessment did not identify any reasons preventing the continued operation or proposed upgrades at this site, provided that the airport maintains compliance with ICAO standards and relevant Namibian legislation.

5 ADMINISTRATIVE, LEGAL AND POLICY REQUIREMENTS

To protect the environment and achieve sustainable development, all projects, plans, programmes and policies deemed to have adverse impacts on the environment require an environmental assessment, as per the Namibian legislation. The legislation and standards provided in Table 5-1 to Table 5-2 govern the environmental assessment process in Namibia and/or are relevant to the airport.

Table 5-1 Namibian law applicable to the airport

Law	Key Aspects
The Namibian Constitution	♦ Promotes the welfare of people. ♦ Incorporates a high level of environmental protection. ♦ Incorporates international agreements as part of Namibian law.
Environmental Management Act Act No. 7 of 2007, Government Notice No. 232 of 2007	♦ Defines the environment. ♦ Promotes sustainable management of the environment and the use of natural resources. ♦ Provide a process of assessment and control of activities with possible significant effects on the environment.
Environmental Management Act Regulations Act No. 7 of 2007, Government Notice No. 28-30 of 2012	♦ Commencement of the Environmental Management Act. ♦ List activities that requires an Environmental Clearance Certificate. ♦ Provide Environmental Impact Assessment Regulations.
Atomic Energy and Radiation Protection Act Act No. 5 of 2005, Government Notice No. 50 of 2005	♦ Regulates the nuclear industry ♦ Makes provision for impact assessments ♦ Makes provision for licencing to transport, store and handle radioactive materials ♦ Sets occupational and public dose limits for ionizing radiation
Namibian Civil Aviation Act & Regulations Act No. 6 of 2016, Government Notice No. 274 of 2020	♦ Provide for a civil aviation regulatory and control framework for maintaining, enhancing and promoting the safety and security of civil aviation for ensuring the implementation of international aviation agreements. ♦ Controls the safe carriage of hazardous goods or substances by air. ♦ Controls the construction, use, or operation of anything hazardous to aviation safety. ♦ Detain dangerous/hazardous goods on grounds if it may not be lawfully kept on an aircraft and the safe disposal thereof. ♦ Licensing requirements for pilots, air traffic controllers, aircraft engineers and cabin crew. ♦ Regulates air traffic control. ♦ Addresses aircraft noise, emissions and pollution control. ♦ Report on aviation incidents and accidents. ♦ Requirements for commercial operators to obtain and maintain an air operate certificate.
Namibian Airports Company Act Act No. 25 of 1998, Government Notice No. 238 of 1998	♦ Establishes the Namibia Airports Company as a public company. ♦ Develops and maintain airport infrastructure. ♦ Ensures safety, security and efficiency. ♦ Promotes commercial activities at airports. ♦ Comply with international civil aviation standards, particular with ICAO regulations.

Law	Key Aspects
Carriage by Air Act Act No. 17 of 1946, Government Gazette No. 3649 of 1946	♦ Gives effect to a convention for the unification of certain rules relating to international carriage by air. ♦ Numerous amendments including Carriage by Air Amendment Act No. 14 of 1992 which adjust its provisions in view of the independence of Namibia.
Air Services Act Act No. 51 of 1949, Government Gazette No. 4201 of 1949	♦ Provides for the licensing and control of air carriers, and air services. ♦ Numerous amendments including Carriage by Air Services Amendment Act No. 31 of 1991 which adjust its provisions in view of the independence of Namibia.
Aerodrome Ordinance 12 of 1963 Ordinance No. 12 of 1963	♦ Provides for the establishment, management and maintenance of airports.
Petroleum Products and Energy Act Act No. 13 of 1990, Government Notice No. 45 of 1990	♦ Regulates petroleum industry. ♦ Makes provision for impact assessment. ♦ Petroleum Products Regulations (Government Notice No. 155 of 2000). o Prescribes South African National Standards (SANS) or equivalents for construction, operation and decommissioning of petroleum facilities (refer to Government Notice No. 21 of 2002).
Water Resources Management Act Act No. 11 of 2013, Government Notice No. 284	♦ Provide for management, protection, development, use and conservation of water resources. ♦ Prevention of water pollution and assignment of liability. ♦ Sets out requirements for the operations of waste treatment sites ♦ Permits and licencing for waste treatment sites
National Heritage Act Act No. 27 of 2004, Government Notice No. 105 of 2005	♦ Provide for the protection and conservation of places and objects of heritage significance and the registration of such places and objects;
Local Authorities Act Act No. 23 of 1992, Government Notice No. 116 of 1992	♦ Define the powers, duties and functions of local authority councils. ♦ Regulates discharges into sewers.
Public and Environmental Health Act Act No. 1 of 2015, Government Notice No. 86 of 2015	♦ Provides a framework for a structured more uniform public and environmental health system, and for incidental matters. ♦ Deals with Integrated Waste Management including waste collection disposal and recycling; waste generation and storage; and sanitation.
Labour Act Act No 11 of 2007, Government Notice No. 236 of 2007	♦ Provides for Labour Law and the protection and safety of employees. ♦ Labour Act, 1992: Regulations relating to the health and safety of employees at work (Government Notice No. 156 of 1997).
Atmospheric Pollution Prevention Ordinance Ordinance No. 11 of 1976	♦ Governs the control of noxious or offensive gases. ♦ Prohibits scheduled process without a registration certificate in a controlled area. ♦ Requires best practical means for preventing or reducing the escape into the atmosphere of noxious or offensive gases produced by the scheduled process.

Law	Key Aspects
Hazardous Substances Ordinance Ordinance No. 14 of 1974	♦ Applies to the manufacture, sale, use, disposal and dumping of hazardous substances as well as their import and export. ♦ Aims to prevent hazardous substances from causing injury, ill-health or the death of human beings.
Pollution Control and Waste Management Bill (draft document)	♦ Not in force yet. ♦ Provides for prevention and control of pollution and waste. ♦ Provides for procedures to be followed for licence applications.
Animal Health Act Act No. 1 of 2011, Government Notice No. 4694 of 2011	♦ To provide for the prevention, detection and control of animal disease; to provide for the maintenance and improvement of animal health; and to provide for incidental matters.

Table 5-2 Municipal by-laws, guidelines and regulations

Municipal By-laws, Guidelines or Regulations	Key Aspects
Integrated Urban Spatial Development Framework for Walvis Bay	♦ Overall vision to transform Walvis Bay to being the primary industrial city in Namibia ♦ Aims to ensure that appropriate levels of environmental management is enforced for all developments in Walvis Bay
Integrated Environmental Policy of Walvis Bay (Agenda 21 Project)	♦ Indicates the directions that the Municipality of Walvis Bay will move towards in the forthcoming years to fulfil its responsibilities to manage the environment of Walvis Bay together with the town's residents and institutions ♦ Strong focus on conservation and protection of environment
Municipal By-law 19 and 20 on Effluents Entering Sewers	♦ Regulates the discharge of effluent into sewers and prohibits the introduction of certain wastes or products including steam into the sewers system.

Table 5-3 Relevant multilateral environmental agreements

Agreement	Key Aspects
Stockholm Declaration on the Human Environment, Stockholm 1972	♦ Recognizes the need for a common outlook and common principles to inspire and guide the people of the world in the preservation and enhancement of the human environment.
1985 Vienna Convention for the Protection of the Ozone Layer	♦ Aims to protect human health and the environment against adverse effects from modification of the Ozone Layer are considered. ♦ Adopted to regulate levels of greenhouse gas concentration in the atmosphere.
United Nations Framework Convention on Climate Change (UNFCCC)	♦ The Convention recognises that developing countries should be accorded appropriate assistance to enable them to fulfil the terms of the Convention.
Convention on Biological Diversity, Rio de Janeiro, 1992	♦ Under article 14 of The Convention, EIAs must be conducted for projects that may negatively affect biological diversity.
Montreal Convention of 1999	♦ Convention for the unification of certain rules relating to international carriage by air.

Table 5-4 Standards or codes of practise

Standard or Code	Key Aspects
International Civil Aviation Organization (ICAO)	♦ Chemicals which may have harmful/toxic effects on the aerodrome environment shall not be used. ♦ Balanced Approach to Aircraft Noise Management. ♦ Fire extinguishing equipment suitable for at least initial intervention in the event of a fuel fire and personnel trained in its use shall be readily available during the ground servicing of an aircraft. ♦ There shall be a means of quickly summoning the rescue and firefighting service in the event of a fire or major fuel spill. ♦ The surface of a paved runway shall be maintained in a condition so as to provide good friction characteristics and low rolling resistance. ♦ Standing water, mud, dust, sand, oil, rubber and other contaminants shall be removed from pavement areas to prevent accumulation. ♦ Slope of apron should be sufficient to prevent accumulation of water but should be kept as level as drainage requirements permit. ♦ Ensure the handling and distribution procedures for consumable products (i.e. food, drink and water supplies) on board aircraft or in the airport are in compliance with the International Health Regulations (2005) and relevant guidelines of the (WHO). ♦ Ensure a safe, sanitary and efficient system is instituted for the removal and disposal of all waste, waste water and other matters dangerous to the health of persons, animals or plants, in compliance with the International Health Regulations (2005) and relevant guidelines of the WHO. ♦ To take effective measures to prevent the spread by means of air navigation of cholera, typhus (epidemic), smallpox, yellow fever, plague, and such other communicable diseases. ♦ Require periodic disinsection of aircraft and review their requirements and modify them, as appropriate, in the light of all available evidence relating to the transmission of insects to their respective territories via aircraft. ♦ The contracting entity shall facilitate the prompt release of dangerous goods/radioactive material being imported by air, particularly material used in medical applications, provided that applicable laws and regulations governing the importation of such material are complied with. ♦ A fence or other suitable barrier shall be provided on an aerodrome to prevent the entrance to the movement area of animals large enough to be a hazard to aircraft. ♦ Wildlife strike hazard assessed through national procedures, to record strikes and collecting info regarding potential hazard to aircraft and ongoing hazard evaluation.
World Health Organization (WHO)	♦ Competent authorities have responsibility to ensure that international airports and aircraft are kept free of sources of infection and contamination. ♦ Competent authorities have the responsibility for the supervision of the removal and safe disposal any

Standard or Code	Key Aspects
	contaminated water or food, human or animal dejecta, wastewater and any other contaminated matter from a conveyance. ♦ Airports are kept in a sanitary condition at all times. ♦ Airports are designed and constructed in a manner that facilitates proper cleaning and disinfection. ♦ Post-event disinfection procedures are in place to prevent the spread of disease and contain contamination at the source. ♦ Aircraft disinfection procedures are in place to prevent the spread of disease and contain infection and contamination at the source.
Airports Council International (ACI)	♦ Improve environmental awareness, training and sharing of information within the airport and among airports worldwide. ♦ Airports should assess and understand emissions from all airport-related sources, their contribution to the local air quality (LAQ) and their effect on compliance with LAQ regulations. ♦ Airports should take the lead in working with stakeholders to adopt measures to reduce emissions in all areas – aircraft, ground support, airport infrastructure and landside access traffic. ♦ Ground transportation arrangements to, from, between and within airports are vital to all users and should be planned and operated in a coordinated manner with the various bodies involved. ♦ Airports should minimize the energy demand of their infrastructure and operations, and move towards less polluting modes of energy and fuel use including generating and using energy from renewable sources. ♦ Airports should work to minimize the use of potable water, to process wastewater (sewage) in the most efficient way possible, reuse of treated water and to manage the quantity and quality of stormwater run-off. ♦ Airports should preserve and enhance the land, soil, water bodies and habitat on and near their properties to preserve the ecology and biodiversity, but without compromising the safety of aircraft operations. ♦ Limit or reduce the number of people affected by significant aircraft noise. ♦ Limit or reduce the impact of aviation emissions on LAQ. ♦ Airports should evaluate environmental risks from their operation and adopt prevention and intervention mechanisms to avoid, reduce or mitigate environmental damage to water, soil and air caused by incidents. ♦ Airports should monitor their ecological footprint and their inputs, outputs and impacts, and provide the information for planning and managing purposes as well as a basis for comprehensive reporting. ♦ The effect of a particular runway alignment on wild life, the general ecology of the area, and noise-sensitive areas of communities should be considered as a primary environmental cost of airport.

Standard or Code	Key Aspects
	♦ Airports should evaluate environmental risks from their operation and adopt prevention and intervention mechanisms to avoid, reduce or mitigate environmental damage to water, soil and air caused by incidents. ♦ Airports should have a Wildlife Hazard Management Plan that is based on a wildlife risk assessment. ♦ Airports should promote the culture of avoiding solid waste generation and, where possible, extracting value from remaining waste with the ultimate goal of sending zero waste to landfills.

The project is listed as an activity requiring an environmental clearance certificate as per the following points from Sections 2, 9 and 10 of Government Notice No. 29 of 2012, It should be noted that a previous environmental assessment was conducted in 2006 for the fuel storage of the back-up generator. The main aviation fuel storage is conducted by a third party who is also responsible for the related environmental clearance certificate. For purposes of inclusion into this management plan, only the back-up generator and water pump station fuel storage tanks are included.

Section 2 of Government Notice No. 29 of 2012: Waste Management, Treatment, Handling and Disposal Activities

- 2.1 The construction of facilities for waste sites, treatment of waste and disposal of waste.
- 2.3 The import, processing, use and recycling, temporary storage, transit or export of waste.
  The Proponent disposes of garden waste (such as trimmings of palm trees), and building rubble at a designated areas within the airport property. These sites are temporary in nature and material is regularly removed from there.

Section 9 of Government Notice No. 29 of 2012: 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. The Proponent stores and handles diesel at the back-up generators and at the water tank pump station.
- 9.5 Construction of filling stations or any other facility for the underground and aboveground storage of dangerous goods, including petrol, diesel, liquid, petroleum, gas or paraffin: Diesel is stored in an aboveground tank for the back-up generator while diesel is also stored at the water tank for pump operations.

Section 10 of Government Notice No. 29 of 2012: Infrastructure

- 10.1 (d) The construction of airports and airfields: Current airport operations was initially established prior to 1991 with continuous improves being conducted to ensure adherence to ICAO. Operations include maintenance and construction activities at the airport.
- 10.1 (j) The construction of masts of any material or type and of any height, including those used for telecommunication broadcasting and radio transmission. Communication towers were constructed as part of the airport infrastructure. It is located within the airport boundaries and may therefore be considered as part of 10.1(d).

6 ENVIRONMENTAL CHARACTERISTICS

This section lists pertinent environmental characteristics of the project area and provides a statement on the potential environmental impacts on each.

6.1 LOCALITY AND SURROUNDING LAND USE

The Walvis Bay International Airport (22.978398°S, 14.642520°E) is located on government properties which is managed by the NAC, situated 15 km east via the C14 from the Walvis Bay central business area. Although located within the Walvis Bay Rural Constituency, the property is surrounded by the Dorob National Park and the Namib-Naukluft Park. The Rooikop Military Base (Wilbard Tashiya Nakada Military Base), previously part of the airport is situated directly southeast of the airport. A sewage treatment plant serving the Airport and the military base is located west of the military base. Industrial properties have been allocated north and further south of the airport (Figure 6-1). Very little development took place in both the industrial areas. A green-hydrogen plant and related photovoltaic solar system was constructed approximately 3.5 km northwest of the airport in the industrial area to the north of the airport.

Active and abandoned quarry operations are located in the surroundings.

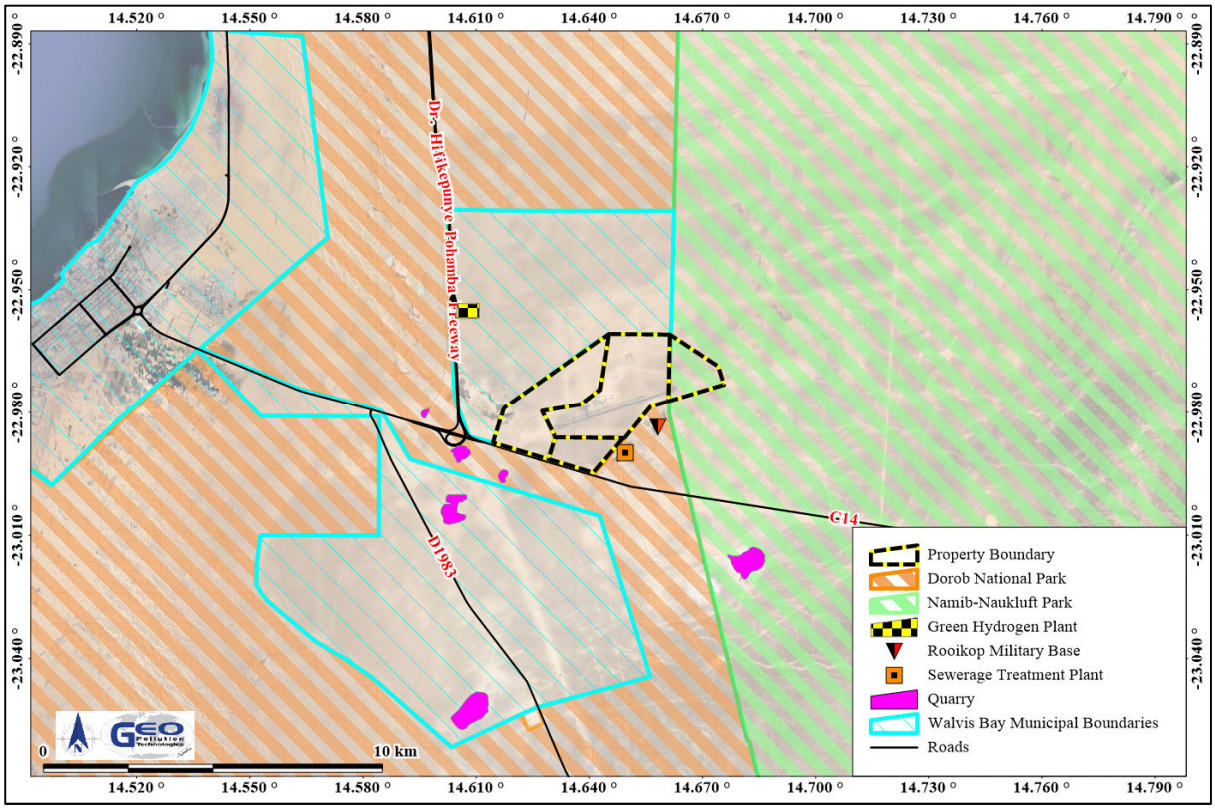


Figure 6-1 Surrounding land use

> ***Implications and Impacts***
>
> The location of the airport is well established and forms part of the landscape character. Surrounding quarry operations may result in dust plumes which may interfere with landing or take-off operations. The photovoltaic solar array is non-reflective and it is not foreseen to affect aircraft operations. Although, aircraft noise will extend beyond the property boundary, the only nearby residential receptor is the Rooikop Military Base.

6.2 CLIMATE

A general lack of weather stations in Namibia is problematic when attempting to get accurate climate data and descriptions for specific locations. Most of the weather stations that were operational in the mid to late 1900's have been closed. The airport does however have a weather

station and for purposes of this report, climate descriptions are thus based on measured data and modelled data from satellite imagery. Data was extracted from the 2022 Atlas of Namibia unless otherwise specified (Atlas of Namibia Team, 2022).

According to the Köppen-Geiger Climate Classification system the project is located in a hot desert climate (BWh) (http://koeppen-geiger.vu-wien.ac.at/present.htm). This means that the area receives precipitation well below potential evapotranspiration and no more than 200 mm of precipitation annually, with a mean annual temperature of at least 18 °C.

Based on Atlas of Namibia data, the average rainfall (exclusive of fog) in the vicinity of the airport is highly variable and range from 0 to100 mm/a, with a variation of more than 100%. The Walvis Bay Airport is expected to receive, on average, much less than 100 mm/a and will likely receive nearer to the zero end of the range. This ambiguity is due to the division of Namibia into very crude rainfall isohyets in the Atlas of Namibia. The potential evapotranspiration of the area is 2,000 to 2,100 mm/a. By dividing the mean annual potential evapotranspiration into the mean annual precipitation, an aridity index value for the area was computed as 0.0, which indicates the area to be hyper arid.

For modelled precipitation data, long-term data for Walvis Bay was sourced from the Climate Hazards Group InfraRed (CHIRPS-2) database (Funk et al., 2015). The CHIRPS-2 dataset consists of long term precipitation data (1981 to near-present) obtained from satellite imagery modelled with in-situ station data. The data is averaged over an area of roughly 5 km by 5 km. This averaging effect should be kept in mind during data analyses as high precipitation from single thunder storm cells would be averaged out, thereby providing a reduced daily maximum precipitation value.

Based on the modelled data, the average annual precipitation (inclusive of fog) at the Walvis Bay Airport over the past 43 years is approximately 63 mm, with a coefficient of variance of 36% (Table 6-1). While the average precipitation is within the range provided by the Atlas of Namibia, it is higher than what is expected of just rainfall, the additional precipitation resulting from regular occurrences of fog. The significantly lower variability in precipitation (36% as opposed to more than 100%, also most likely as a result of the fog.

While rainfall is generally low and infrequent, occasional heavy downpours can occur and most likely between November and April. The highest single recorded event being 25 mm in the month of March over the past 43 years. Such rainfall events often cause significant disruption, as local infrastructure is not designed to manage large volumes of stormwater.

Fog is a major source of moisture along the Namibian coast and in the Namib Desert, supporting both plant and animal life. The airport may receive fog between 15-20% of the time (Atlas of Namibia Team, 2022), produced by the cooling effect of the cold Benguela Current on humid air, resulting in frequent fog and low-level clouds.

Table 6-1 Precipitation statistics (Funk et al., 2015)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum (mm)	0	0	0	0	0	0	0	0	0	0	0	0
Maximum (mm)	25	19	43	25	11	3	1	2	2	10	22	25
Average (mm)	9	9	13	7	1	0	0	0	0	4	10	9
Variability (%)	61	50	67	80	267	275	321	407	234	68	40	58
Daily maximum (mm)	14	11	25	19	5	3	1	2	2	6	11	14
Average rain days	2	2	2	2	0	0	0	0	0	1	2	2

Season July - June average: 63 mm | Season coefficient of variation: 36 %

Date range: 1981-July-1 to 2024-June-30 | Lat: 22.97840°S; Long: 14.64252°E

Similar to modelled precipitation data, monthly temperature data is also obtained from satellite data. The data was retrieved from the Modern-Era Retrospective analysis for Research and Applications version 2 (MERRA-2) data set for a height of 2 m above surface (Gelaro R, et al.,

2017). This data set is a NASA atmospheric reanalysis, incorporating satellite data integration and aims at historical climate analyses at 0.5 ° x 0.625 ° spatial resolution. Table 6-2 presents statistics of daily data abstracted from the data set for the last 43 years. The lowest temperatures (9 °C) over the data period were recorded from June to September while the highest temperature of 35 °C was measured from September to December and again in March and April. Temperatures never decrease to levels below 0 °C.

Table 6-2 Temperature statistics based on Merra-2 data (Gelaro R, et al., 2017)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum (°C)	14	14	13	11	11	9	9	9	9	10	12	13
Maximum (°C)	33	34	35	35	34	32	31	33	35	35	35	31
Average (°C)	19	20	19	19	19	18	17	16	16	16	17	18
Diurnal (°C)	4	5	5	6	7	7	8	7	6	6	5	5
Average days < 0°C	0	0	0	0	0	0	0	0	0	0	0	0

Studies indicate the presence of a thermal inversion layer at Walvis Bay. Originally this was thought to be at approximately 500 mamsl (Taljaard and Schumann 1940), but recent studies indicate it as low as 200 mamsl (Patricola and Chang, 2017; Corbett, 2018). A marine atmospheric boundary layer (MBL) exists offshore of the coastline that thins from more than 500 mamsl to 200 mamsl as it nears the coast (Figure 6-2). The MBL is a layer of cool, well-mixed, stable air that is capped by a thermal inversion (Patricola and Chang, 2016; Corbett 2018). This thermal layer or inversion layer will prevent the escape of pollutants such as smoke higher into the atmosphere. The MBL however contribute to high velocity wind speeds by funnelling the winds created by the South Atlantic High (SAH), resulting in what is referred to as the Benguela Low-Level Coastal Jet (Figure 6-2). Since the MBL overlap partially with the coastal plain, the wind generated by the Benguela Low-Level Coastal Jet also reaches inland, but diminishes relatively quickly further inland.

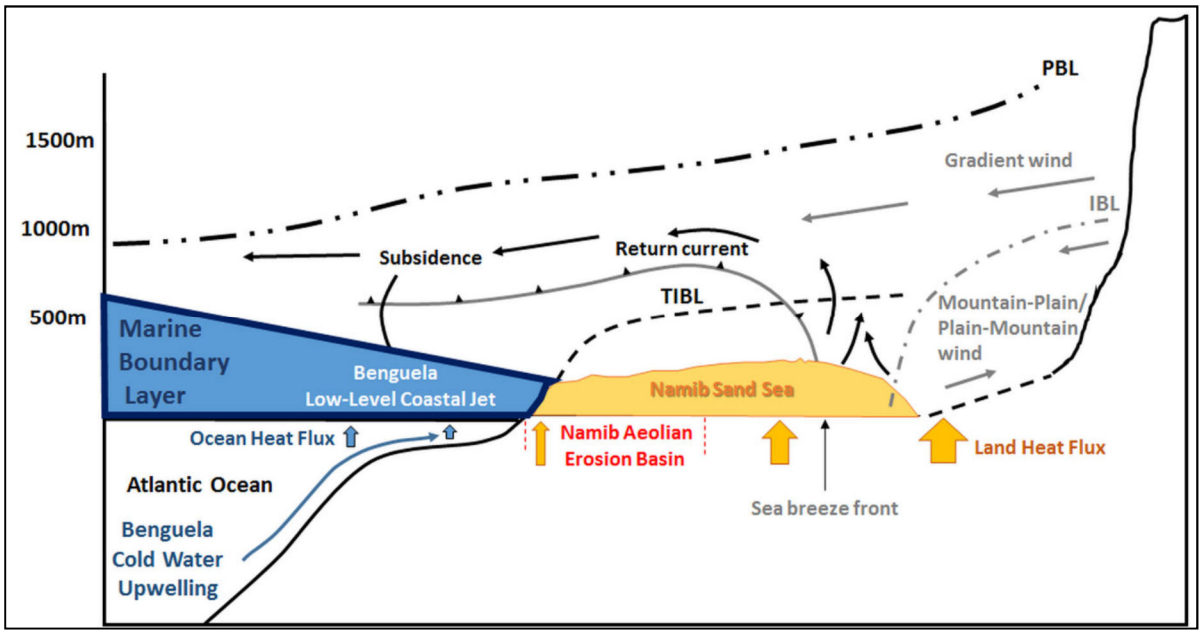


Figure 6-2 Marine atmospheric boundary layer (from: Corbett, 2018)

On a more localised scale, the climatic conditions on the central Namibian coast, and inland thereof (coastal plains), are strongly influenced by the cold Benguela Current, the SAH and the relatively flat coastal plains that are separated from the central highlands by a steep escarpment.

The anticlockwise circulation of the high-pressure SAH and the action of the earth's Coriolis force results in strong southerly (longshore) winds blowing northwards up the coastline of Namibia (Bryant, 2010; Corbett, 2018). This longshore wind is responsible for upwelling of the

cold, deep waters of the Benguela Current. As a result of the temperature difference between the cold surface water of the Benguela Current and the warm coastal plains, the southerly wind is diverted to a south-southwesterly to southwesterly wind along the coast. At Walvis Bay, the temperature gradient that forms over the warmer, darker sands south of the Kuiseb River compared with the cooler, lighter coloured gravel plain to the north of the river leads to the formation of cyclonic circulation (localised low-pressure systems) centred over the dune area, due to warm air rising over the dunes. Together with topographical changes and land use, this causes a local deflection of wind flow over the Walvis Bay area, from south to southwest in Walvis Bay, to more southwest to westerly further inland along with reduced wind speeds. The lower speed, westerly winds are, for example, experienced at Walvis Bay International Airport.

The winds are strongest in early to mid-summer (September to January) when the SAH is at its strongest and most persistent, and the temperature difference between the sea and the desert plains are at its greatest. Wind speeds then occasionally exceed 32 km/hr and usually peaks late morning to early afternoon. In winter, the SAH loses strength and the southerly to southwesterly winds are at their weakest. Winter winds do not have enough strength to reach far inland. Autumn to winter conditions do however promote the formation of east wind conditions (berg winds) that can reach speeds of more than 50 km/hr and transport a lot of sand. East winds occur when the inland plateau is cold with a localised high pressure cell, while a low pressure system is present at the coast. The high pressure cell forces air off the escarpment and as the air descents, it warms adiabatically as well as create a low pressure system due to the vertical expansion of the air column. The warm air flows toward the coastal low and as it passes over the Namib plains, it heats up even further. The wind manifests itself as very strong, warm and dry wind during the mornings to early afternoon, but dissipate in the late afternoon.

Figure 6-3 indicates that the prevailing winds at the Walvis Bay airport are predominantly from the southwest and less frequently form the north-northeast. Westerly to northwesterly winds at lower velocities are much less frequent with southeasterly winds being very infrequent. The orientation of the airstrip was built to align with the predominant winds i.e. in a southwest to northeast direction.

Throughout the year the prevailing night time regional wind is a weak easterly wind. This results when the mainland cools to below the temperature of the coastal water. This results in a coastal low versus an onshore high pressure system with first no wind in the early evening, when temperatures between water and land is similar, and then weak easterly winds as the temperature difference increase.

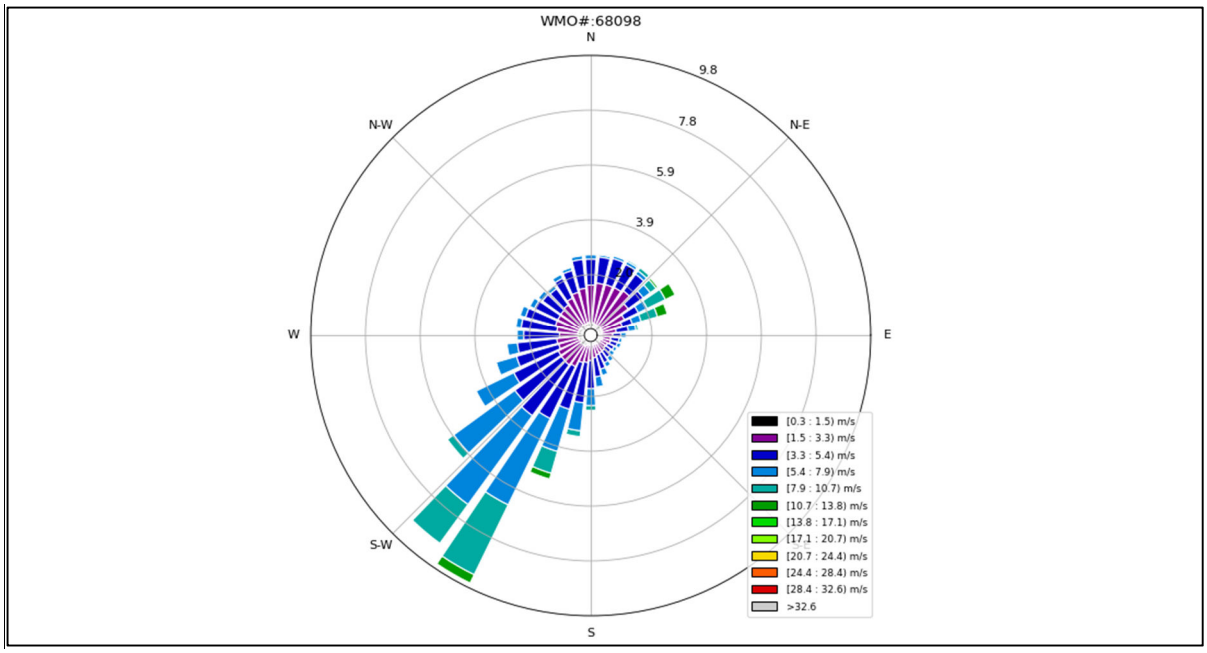


Figure 6-3 Walvis Bay International Airport wind rose (2021 to 2025 data)

Implications and Impacts

Rainfall events are typically low, infrequent and with high degrees of variability. The extreme variability in seasonal rainfall makes water an extremely vulnerable resource. Surface runoff containing pollutants can contaminate the environment. Pooling of rainwater on the runway can impact aeroplane landing and take-off. Thick fog may cause delays to incoming and outgoing flights. The region experiences the "east weather phenomenon," a hot, dry wind from the inland plateau that occasionally reaches the coast during winter months. This can lead to elevated temperatures strong winds and low visibility due to sand storms.

6.3 CORROSIVE ENVIRONMENT

The Namibian coast is a very corrosive environment, which may be attributed to the frequent salt-laden fog, periodic winds and abundance of aggressive salts (dominantly NaCl and sulphates) in the soil. The periodic release of hydrogen sulphide (H_2S) from the ocean is expected to contribute to corrosion. Although the airport is located some 15 km inland, salt-laden fog often reach it. The airport may receive fog between 15-20% of the time with the fog belt reaching inland up to 100 km (Atlas of Namibia Team, 2022). In comparison, Walvis Bay is considered to receive fog for 25-30% of the time. Corrosion of different elements was documented over a 20 year time period for a number of coastal towns in Southern Africa. Indicated in Figure 6-4, Walvis Bay has a comparatively higher corrosion rate for some metals (Callaghan 1991).

Figure 6-4 Corrosion exposure results in southern African towns (Callaghan 1991)

Implications and Impacts

The combination of high moisture and salt content of the surface soil and fog can lead to rapid deterioration of metal (e.g. pipelines) and concrete structures. Chemical weathering of surface and subsurface structures will require continuous and additional maintenance.

6.4 TOPOGRAPHY AND DRAINAGE

The airport is located within the Coastal Plain Landscape, which can be divided into 3 areas (Atlas of Namibia Team, 2022). The northern Namib, having rugged mountains and dune fields, mainly north of the Ugab River. The central Namib between the Ugab River and the Kuiseb River where the terrain is a relatively flat gravel plain with inselbergs. The southern Namib south of the Kuiseb River where the relatively flat terrain is covered by a dune sea and some scattered inselbergs. As the project location is just north of the Kuiseb River, it falls within the Central Namib Coastal Plain.

Although the landscape is known to have granite outcrops (inselbergs) and protruding dolerite dykes, the majority of the landscape have mostly been levelled off to form an overall even surface, overlain with gravel and a thin layer of sand. The landscape also forms part of the most arid areas of Namibia, with precipitation presenting mainly as fog. Drainage and soils of the site are influenced by its surrounding topography, which overall, gently slopes to the west. Outcrops east of the airport, result in steeper slopes and higher run-off rates during rainfall events. Elevation on the eastern boundary is 113 mamsl which dips to 56 mamsl along the western boundary, indicating an elevation drop of over 50 m. Due to the flat slope (<5%) of the majority of surrounding and upstream areas, the drainage network is poorly developed and can lead to localised pooling The Rooikop Hill, located approximately 400 m southeast of the main runway, rises to 129 mamsl.

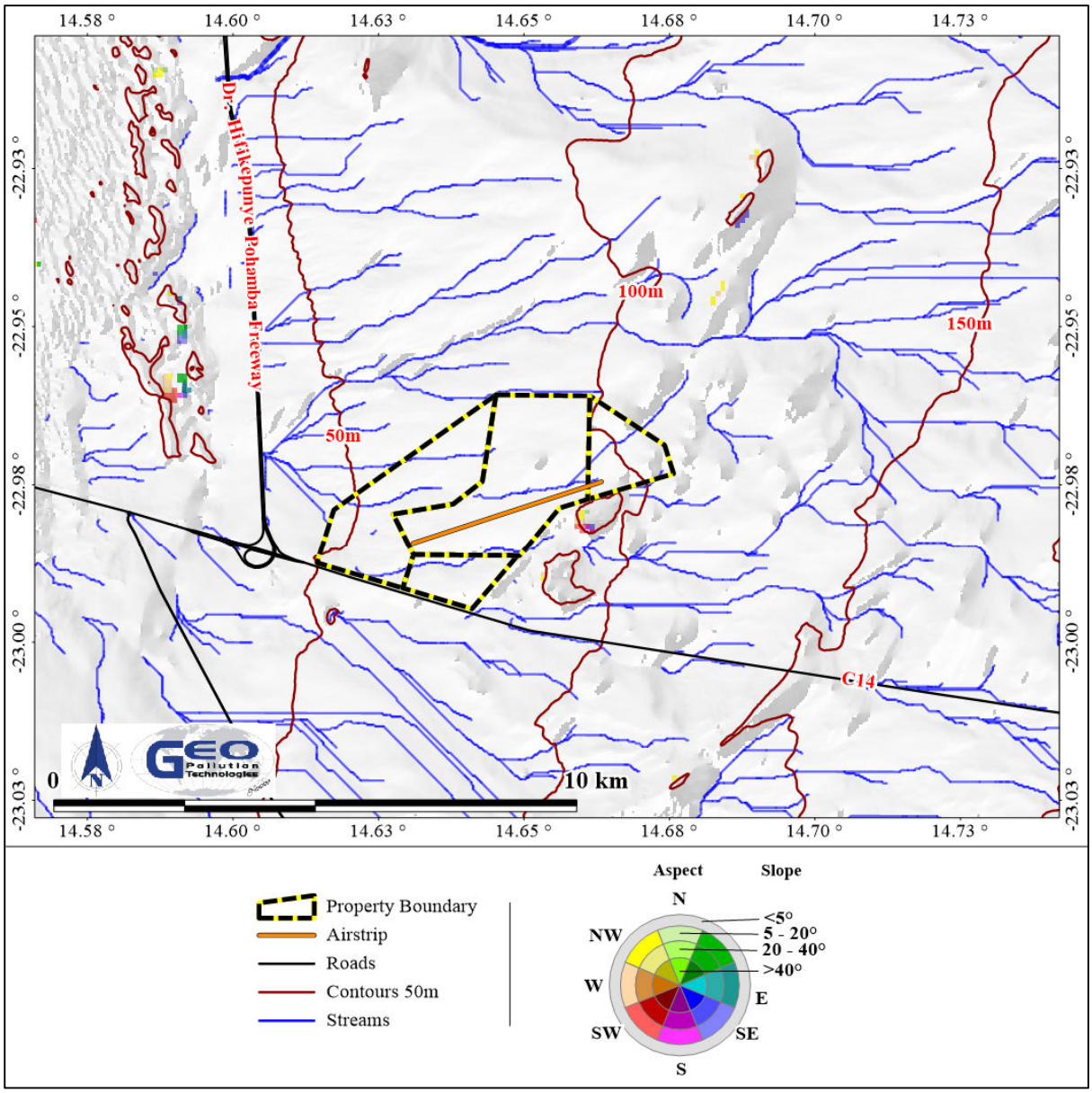


Figure 6-5 Aspect slope and drainage

Implications and Impacts

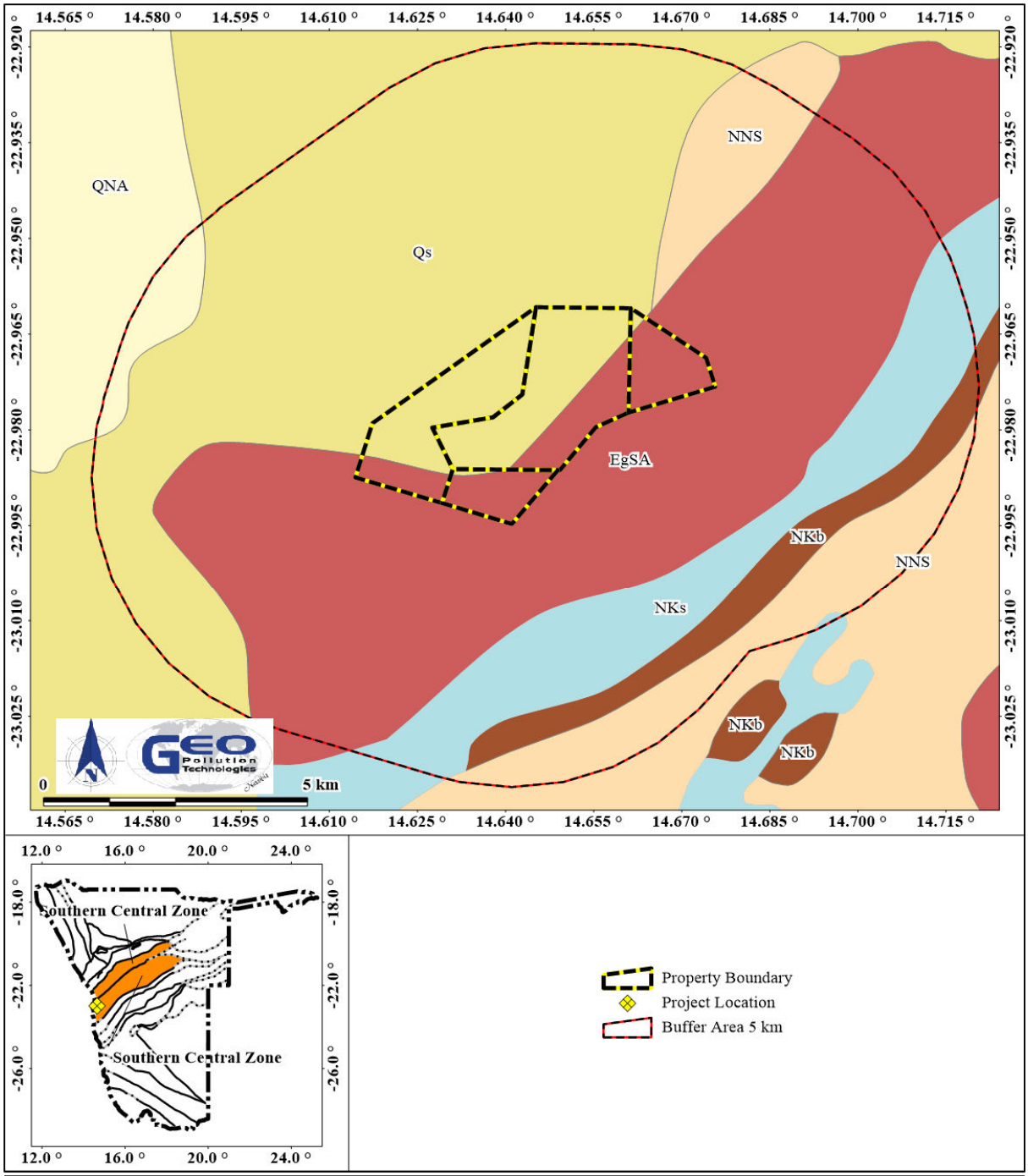
There are no significant topographical features which will impact, or be impacted by, the existing operations. Due to the arid conditions, rainfall and related run-off is rare. However in such an event, any runoff will likely flow along anthropogenic flow paths, such as roads. During such an event pollutants and litter, may be carried from the site to surrounding properties.

6.5 GEOLOGY

Dominant soil type for the project area is Calcic Petric Gypsisol (Yermic) which refers to the soil type that forms in regions where sources of sulphate mix with calcium rich soil to form gypsum and where evaporation exceeds precipitation. In addition to this, the gypsisol of this particular area is known for having been strongly cemented or indurated within 100 cm from the soil surface; having, between 50 and 100 cm from the soil surface, a calcic horizon or concentrations of secondary carbonates. The composition of soil in this particular area is roughly 75-80 % sand, 10-15 % silt and 0-5 % clay which gives it the characteristics and texture of Loamy Sand soil.

Geological formations at the project location consist of a relative thin cover of Quartanary Age alluvium, sand, gravel and or calcrete, which covers the underlying Salem Suite (Cambrian Age). The Salem Suite consists mainly of Syn- to post-tectonic granite, granodiorite, monzonite and or diorite. Groundwater flow would be mostly through secondary porosity flow along fractures, faults and other geological structures present within the underlying formations and in the soil cover on the hard rock formations.

Groundwater forms part of the Erongo Basin and is not utilised in the area and no boreholes are present nearby. Water remains the property of the Government of Namibia.



Age	Lith Code	Supergroup	Group	Subgroup	Formation	Suite	Description
Quaternary	QNA		Namib				Surficial deposits
Quaternary	Qs		Namib				Surficial deposits
Cambrian	EgSA	Damara				Salem	Granite and granitic rocks
Namibian	NKs	Damara	Swakop	Khomas	Kuiseb		Schist, marble, quartzite
Namibian	NKb	Damara	Swakop	Khomas	Karibib		Marble, schist, quartzite
Namibian	NNS	Damara	Nosib				Quartzite, conglomerate, shale/schist

Figure 6-6 Geology (Geological Survey of Namibia - 1: 1 000 000 geological map)

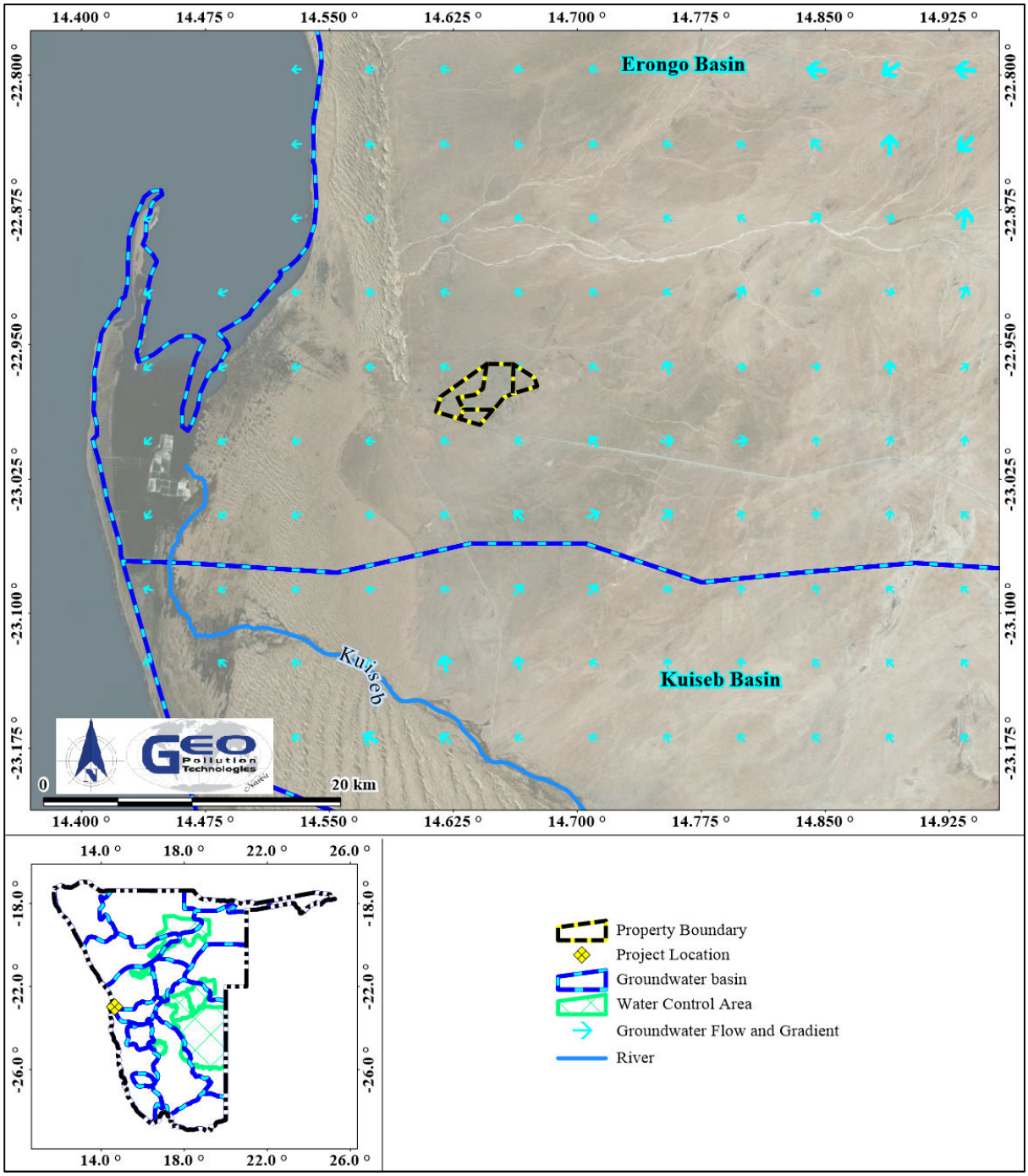


Figure 6-7 Groundwater flow

Implications and Impacts

Groundwater is not utilised in the area, however groundwater is a scarce and valuable source in Namibia and must be protected at all costs. The presence of gypsum in the top soil can create unstable subsurface conditions due to crystal growth and dissolution of gypsum.

6.6 PUBLIC WATER SUPPLY

Public water supply to Walvis Bay and the airport is provided by NamWater from the NamWater Kuiseb Water Supply Scheme.

Implications and Impacts

Public water supply would not be at risk as a result of activities on the project area.

6.7 FAUNA AND FLORA

This region is located in the Namib Desert biome. This biome features conditions that are hostile to most plants, meaning that the vegetation found in this area has adapted well to withstand their harsh environment. Most of the flora in this biome are located in rocky areas while trees are most common along ephemeral rives that run towards the coast. It can further be classified under the Southern desert sub-biome and forms part of the floristic group of Welwitschia desert. The area hosts up to 49 species of flora with a very low percentage (0-5%) of the area being covered by woody plants. A total of 9 plant species are considered endemic to the greater area, with no species considered to be locally endemic (Atlas of Namibia Team, 2022).

Of the 217 species of mammals in Namibia, 16 to 30 species occur in the area. Species are considered to be endemic when 75% to 100% of individuals, or their distributions within the country. Between 3 to 4 species of mammals are considered to be endemic to the area. Around 1 to 2 species of large herbivores are expected to occur naturally in the area. Namibia has 32 carnivore species (mammals in the taxonomic order Carnivora). Less than 10 carnivore species are probable to occur naturally in the area (Atlas of Namibia Team, 2022).

Nearly all vegetation has already been removed or altered on site when the existing operations was established. However adaptation by species may occur in terms of nesting sites and territory extension (such as the garden disposal site) at anthropogenically transformed or impacted areas. It is important to note that that airport lies adjacent to both the Dorob and Namib-Naukluft National Parks. Both of the parks present protection suitable for fauna and flora species.

The Namib Desert has an extremely rich lichen diversity. Schultz (2006) identified a predominantly crustose lichen zone in the southernmost part of the gravel plains of the Namib, approximately 20 km east of Walvis Bay around the C14 road between Walvis Bay and Solitaire. Important lichen fields are located approximately 3.5 km east and southeast of the site while a small pocket of lichen are located approximately 1.5 km south of the main runway.

Darkling Beetle (Photo 6-1), *Cauricara eburnea*, which is a species of beetle found in Southern Africa, specifically in Namibia, was observed on site. It is known as the long-legged white Namib beetle or white Namib Toktokkie. These beetles are known for their ability to collect water from fog and dew, a characteristic that has drawn significant scientific interest.

Photo 6-1 White Namib Toktokkie (*Cauricara eburnea*) on site

Photo 6-2 Great white pelicans adjacent to sewerage treatment plant

The sewerage treatment plant southeast of the airport forms a series of ponds that attract wildlife to the area, thus increasing the possibility of animal sightings in the area. Observations on and surrounding the site included pelicans (Great White Pelican), springbuck and hyena tracks (Photo 6-2).

The wastewater treatment ponds may, significantly, attract birds from the Important Bird Areas (IBA) at the coast. Walvis Bay lies within IBA NA014 and NA013 (http://datazone.birdlife.org; Simmons et al. 1999), 15 km west of the airport. IBA NA014 can be regarded as the most important coastal wetland area in southern Africa. Of note is the Walvis Bay Lagoon, the salt works and the southern part of the bay west of the lagoon, which are the key components of the 12,600 ha Ramsar site (Wetland of International Importance). It is important both as an over-wintering area for Palaearctic migrant wader species as well as for African species such as

Greater and Lesser Flamingos, Great White Pelican and Chestnut-Banded Plovers. The sewerage ponds, located just outside of Walvis Bay, are regarded as sensitive artificial wetland. Although a manmade fresh water source, it is an attraction for pelicans and flamingos. The artificial wetland also support 53% of the duck and geese population in the area. The wetland is formed by the constant inflow of semi-purified water and supports extensive stands of reeds. Similarly the sewerage pond next to the airport has resulted in an artificial wetland which attract the same species. There are flight paths for birds between the two sets of sewerage ponds (the one close to Walvis Bay and the other next to the airport), the lagoon and the offshore bird breeding platform (Guano Platform) north northeast of the harbour (Figure 6-8). In addition, seasonally wet areas or any standing water may present as additional bird habitat between these main discussed areas.

IBA NA013, consist of the coastal area between Walvis Bay and Swakopmund, and is approximately 30 km long and 700 m wide. Bird counts on this exceed 13,000 shorebirds of approximately 31 species, most of which are Palearctic migrants. IBA NAO13 is not only the richest shoreline in terms of shorebird density anywhere in southern Africa, but also supports the densest colony of breeding Damara Terns known (Scott & Scott 2013). Important in this area is the guano platform, that provides roosting and breeding sites to large numbers of birds.

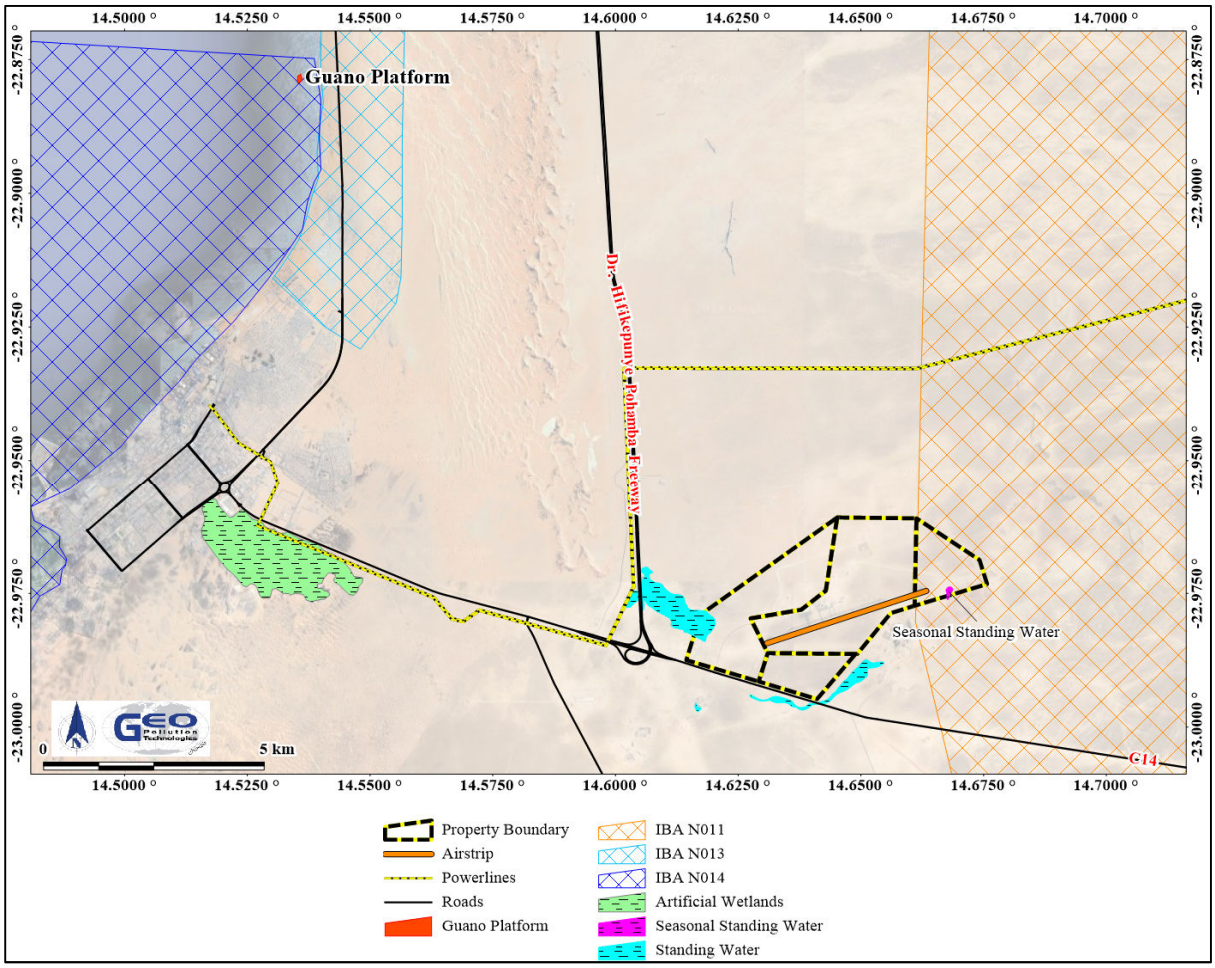


Figure 6-8 Important bird areas

Implications and Impacts

The airport is located within an already disturbed area. Thus, no immediate threat to habitat loss in the area is expected, however, fauna may adapt to incorporate infrastructure components into their habitat. In addition uncontrolled and uncontained pollution, such as wind-blown debris, may and can cause damage to any biodiversity surrounding the property. The relative close proximity of important bird areas and related flight paths from these areas to the nearby standing water bodies are of concern.

6.8 DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS

The project area falls within the Erongo Region. The Erongo Region's population density is 3.8 per km^2. See Table 6-3 for general demographic characteristics of the area.

Table 6-3 Demographic characteristics of Walvis Bay, the Erongo Region and nationally (Namibia Statistics Agency, 2023)

	Walvis Bay	Erongo Region	Namibia
Population (Males)	51,817*	122,322*	1,474,224*
Population (Females)	50,887*	117,884*	1,548,177*
Population (Total)	102,704*	240,206*	3,022,401*
Unemployment (15+ years)	N/A	32%	33.8%
Literacy (15+ years)	N/A	95.4%	87.7%
Education at secondary level (15+ years)	N/A	60.4%	51.2%
Households considered poor	N/A	N/A%	19.5%

**Data available from preliminary results only (National Planning Commission, 2023)*

Implications and Impacts

The airport provides employment to people from the area. A broad spectrum of skills development and training also benefit employees during the operational phases.

6.9 CULTURAL, HERITAGE AND ARCHAEOLOGICAL ASPECTS

Within the property of the NAC, there are no churches, mosques or related buildings and no known archaeological resources or other structures, sites or spheres of heritage or cultural significance. However, the airport itself has some historical significance which is well documented.

Implications and Impacts

No impact on cultural, heritage and archaeological aspects are expected.

7 ENVIRONMENTAL MANAGEMENT PLAN

The EMP provides management options to ensure impacts of the facility are minimised. An EMP is a tool used to take pro-active action by addressing potential problems before they occur. This should limit the corrective measures needed, although additional mitigation measures might be included if necessary. The environmental management measures are provided in the tables and descriptions below. These management measures should be adhered to during the various phases of the operation of the facility. This section of the report can act as a stand-alone document. All personnel taking part in the operations of the airport should be made aware of the contents in this section, so as to plan the operations accordingly and in an environmentally sound manner.

The objectives of the EMP are:

- to include all components of operations of the airport;
- to prescribe the best practicable control methods to lessen the environmental impacts;
- to monitor and audit the performance of operational personnel in applying such controls; and
- to ensure that appropriate environmental training is provided to responsible operational personnel.

Various potential and definite impacts will emanate from the operations and potential decommissioning phases. The majority of these impacts can be mitigated or prevented. The impacts, risk rating of impacts as well as prevention and mitigation measures are listed below.

As depicted in the subsections below, impacts are expected to mostly be of medium to low significance and can mostly be mitigated to have a low significance. The extent of impacts are mostly site specific to local and are not of a permanent nature. Due to the nature of the surrounding areas, cumulative impacts are possible and include groundwater contamination and traffic impacts.

7.1 PLANNING

During the phases of planning for operations and decommissioning of the airport, it is the responsibility of the Proponent to ensure they are, and remain, compliant with all legal requirements. The Proponent must also ensure that all required management measures are in place prior to and during all phases, to ensure potential impacts and risks are minimised. The following actions are recommended for the planning phase and should continue during various other phases of the project:

- Ensure that all necessary permits from the various ministries, local authorities and any other bodies that governs the operations of the project remains valid.
- Ensure all appointed contractors and employees as well as tenants (e.g. car rental agencies and fuel depot operator) enter into an agreement which includes the EMP. Ensure that the contents of the EMP is understood by the contractors, sub-contractors, employees and all personnel present or who will be present on site.
- Make provisions to have a Health, Safety and Environmental Coordinator to implement the EMP and oversee occupational health and safety as well as general environmental related compliance at the site.
- Have at least the following emergency plans, equipment and personnel on site where reasonable to deal with all potential emergencies:
    - Risk management / mitigation / EMP/ Emergency Response Plan and HSE Manuals;
    - Adequate protection and indemnity insurance cover for incidents;
    - Comply with the provisions of all relevant safety standards;
    - Procedures, equipment and materials required for emergencies.
- If one has not already been established, establish and maintain a fund for future ecological restoration of the project site, should a relevant event occur or project activities cease and the site is decommissioned and environmental restoration or pollution remediation is required.
- Establish and / or maintain a reporting system to report on aspects of operations and decommissioning as outlined in the EMP.
- Submit bi-annual reports to the MEFT to allow for environmental clearance certificate renewal after three years. This is a requirement by MEFT.
- Appoint a specialist environmental consultant to update the EMP and apply for renewal of the Environmental Clearance Certificate prior to expiry.

The Proponent may include additional measures as part of the environmental management, especially those as highlighted by ICAO. Additional management measure may include those adapted from the following resources:

- ICAO's ECO Airport Toolkit: Innovation and Technology in Airport Sustainability.
- ICAO's ECO Airport Toolkit: Environmental Impacts of Unmanned Aircraft Operations at and Around Airports.
- ICAO's ECO Airport Toolkit: Sustainable Considerations for Airport Surface Access.
- ICAO's ECO Airport Toolkit: A Focus on the Production of Renewable Energy at the Airport Site.
- Airport Planning Manual Doc 9184. Part 1 Master Planning, 2nd Edition.
- Airport Planning Manual Doc 9184. Part 2 Land Use and Environmental Control, 4th Edition.
- ICAO document - CORSIA Methodology for Calculating Actual Life Cycle Emissions Values, 1st Edition.
- Guidance on Environmental Assessment of Proposed Air Traffic Management Operational Changes Doc 10031, First Edition.
- ICAO Doc 9931 - Continuous Descent Operations (CDO) Manual.
- ICAO Doc 8168 - Procedures for Air Navigation Services - Aircraft Operations (OPS).
- ICAO Doc 9750 - Global Air Navigation Plan for CNS/ATM Systems.
- Airport Services Manual Airport Emergency Planning Doc 9137 Part 7.
- The Convention on International Civil Aviation Annexes 1 to 18.

7.1.1 Skills, Technology and Development

Staff training and promoting awareness are key in multiplying efforts to reduce adverse environmental impacts from airports and aviation. During various phases of the airport, training is provided to a portion of the workforce, in order to maintain and operate various features of airport infrastructure according to the required standards. Skills are transferred to an unskilled workforce for general tasks. Development of people and technology are key to economic development. The airport provides employment to many people.

Desired outcome: To see an increase in skills of local Namibians.

Actions

Mitigation:

- Comply with ACI and airport training and information sharing policies.
- If the skills exist locally, contractors must first be sourced from the town, then the region and then nationally. Deviations from this practice must be justified.
- Skills development and improvement programs to be made available as identified during performance assessments.
- Employees to be informed about parameters and requirements for references upon employment.
- The Proponent must employ Namibians where possible. Deviations from this practise should be justified appropriately.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Record should be kept of training provided.
- Ensure that all training is certified or managerial reference provided (proof provided to the employees) inclusive of training attendance, completion and implementation.
- Bi-annual summary report based on records kept.

7.1.2 Revenue Generation and Employment

The change in land use has led to changes in the way revenue is generated and paid to the national treasury. Flights to and from the airport play an extremely important role in the transport of visitors and cargo (domestic, regional and international), which contribute to the Namibian economy. An increase of skilled and professional labour has and will continue to take place due to the continual operations of the airport. Employment is sourced locally while skilled labour/contractors may be sourced from other regions.

Desired outcome: Contribution to national treasury and provision of employment to local Namibians.

Actions

Mitigation:

- The Proponent must employ local Namibians where possible.
- If the skills exist locally, employees must first be sourced from the town, then the region and then nationally.
- Deviations from this practice must be justified.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Bi-annual summary report based on employee records.

7.1.3 Demographic Profile and Community Health

The project is reliant on labour during the operational phase. Labourers are mainly transported to and from Walvis Bay on a daily basis. No influx to the immediate environment of job seekers is expected but it may impact nearby towns.

Desired Outcome: To prevent the spread of communicable diseases and prevent / discourage socially deviant behaviour.

Actions

Prevention:

- The Proponent needs to employ a Community Liaison Officer who will be responsible for community engagement for environmental related issues. The Proponent needs to draft a stakeholder engagement plan which should include the requirements of the Airport Planning Manual Doc 9184. Part 2 Land Use and Environmental Control, 4th Edition, as well as ICAO Circular 35: Community Engagement for Aviation Environmental Management.
- Employ only local people from the area, deviations from this practice should be justified appropriately.
- Adhere to all municipal by-laws relating to environmental health which includes but is not limited to sanitation requirements.

Mitigation:

- Educational programmes and distribution of material for employees on HIV/AIDs and general upliftment of employees' social status.
- Appointment of reputable contractors.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Bi-annual summary report based on educational programmes and training conducted.
- Bi-annual report and review of employee demographics.

7.1.4 Road Traffic

Airports are strong transport nodes where multiple transport modes usually converge. The Walvis Bay International Airport is however currently linked to a single carriage way that is being upgraded to service all commuters. In addition taxis and motor vehicle hiring companies also operate within boundaries of the airport. Road traffic management is an important aspect to prevent incidents and accidents at the airport or traveling towards it. Within the airport small incidents and accidents may occur due to driver error of possible faulty equipment (such as spikes or security booms).

Desired Outcome: Minimum impact on traffic and no transport or traffic related incidents.

Actions

Prevention:

- Erect clear signage regarding access and exit points at the various public service points, such as the drop-off zone, long term parking, services areas and short term parking.
- Ensure effective operations of all traffic regulating systems at the airport, including security booms, security systems and parking services.
- Clearly erect traffic regulating signs indicating for example speed limits and speed humps.
- All vehicle operators transporting travellers to and from aircraft, need to be services, licensed and operated by suitably licensed drivers.
- No servicing of refuelling vehicles, luggage carts or busses are allowed on the airstrip or nearby airport tarmac, all servicing to be conducted at appropriate and designated areas.
- Trucks, e.g. tanker trucks delivering fuel, need to make use of dedicated access points and should not be allowed to obstruct any traffic.

Mitigation:

- If any traffic impacts are expected, traffic management should be performed to prevent these.
- The placement of signs to warn and direct traffic can mitigate traffic impacts.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Any complaints received regarding traffic issues should be recorded together with action taken to prevent impacts from repeating itself.
- A report should be compiled every 6 months of all incidents reported, complaints received, and action taken.

7.1.5 Air Traffic

Air traffic management in Namibia requires integration and adherence to the Namibia Civil Aviation Authority and their related policies, which in turn have to integrate with the International Civil Aviation Organization. The vision and mission of the International Civil Aviation Organization, which is a United Nations Agency, is to assist member countries to cooperate together, sharing airspace, for mutual benefit. Therefore the ICAO has developed various procedures, polices and reference documentation (such as manuals) which may then be adopted by the various national civil aviation authorities of member states. These resources are extensive and cover all air traffic related concerns ranging from aircraft maintenance, operations and support systems to pilot licensing. An imported section is functional integration such as air-ground data links.

Airports, are expected to comply with the air traffic management procedures, as adopted by the national aviation authorities. These include but are not limited to communication, navigation, emergency and security aspects. Any errors or shortcoming in terms of air traffic management may result in a range of incidents or impacts from minor to a catastrophic scale.

An increasing concern in terms of air traffic further relates to the increased use of unmanned aircraft systems and remotely piloted aircraft systems. In Namibia these operations are regulated by the Civil Aviation Authority which is also responsible to share related information to airports.

Model flying activities taking place on weekends 17:00, southwest of FYWB at position 230237S 0143515E

Desired Outcome: Minimize the adverse environmental effects of civil aviation activities. To ensure safe and secure air transport of people and goods.

Actions

Prevention:

- Ensure adherence to ICAO, ACI, WHO and World Bank regulations related to air traffic management. Consideration should be awarded, amongst others to the requirements of Aerodrome as per ICAO Doc 9157, Aerodrome Design Manual.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Any complaints received regarding air traffic issues should be recorded together with action taken to prevent impacts from repeating itself.
- A report should be compiled every 6 months of all incidents reported or complaints received.

7.1.6 Health, Safety and Security

Every activity associated with the project is reliant on human labour and therefore exposes them to health and safety risks. Activities such as the operations of machinery and handling of hazardous chemicals (carcinogenic effect of some petroleum products) will pose the main risks to employees during the operational phase. Security risk are related to unauthorized entry, theft and sabotage.

Desired Outcome: To prevent injury, health impacts and theft.

Actions

Prevention:

- Maintain the airside security fence to ensure a safe airside environment.
- Minimize unnecessary crossing of the landside / airside interface to prevent opportunistic exploitation of such crossing for criminal reasons.
- Devise, implement and regularly update a health, safety, environment and quality (SHEQ) plan and appoint a SHEQ manager.
- Implement and maintain an integrated health and safety management system, to act as a monitoring and mitigating tool, which includes: colour coding of pipes, operational, safe work and medical procedures, permits to work, emergency response plans, housekeeping rules, MSDS's and signage requirements.
- Clearly label dangerous and restricted areas as well as dangerous equipment / products.
- Equipment that will be locked away on site must be placed in a way that does not encourage criminal activities (e.g. theft).
- Provide all employees with required and adequate personal protective equipment (PPE).
- Ensure that all personnel receive adequate training on operation of equipment / handling of hazardous substances.
- All Health and Safety standards specified in the Labour Act should be complied with.
- Implementation of a maintenance register for all equipment and fuel / hazardous substance storage areas.
- Compliance with ICAO, ACI and WHO regulations relating to aircraft disinfection (spraying to rid aircraft of any foreign organisms). Additional consideration of ICAO requirements should include:
    - Managing safety risks posed by the carriage of lithium batteries by air (Ref: Job Card DGP.003.04).
- Confiscated contraband should be disposed of safely and appropriately.
- Food waste must be regarded as potentially contaminated and be prevented from being scavenged.
- Ensure properly trained security and staff are employed and that all security measures are implemented at all times.

Mitigation:

- Selected personnel should be trained in first aid and first aid kits must be available on site. Emergency services must be readily available.
- Rapid response to incidents is crucial.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Any incidents must be recorded with action taken to prevent future occurrences.
- A report should be compiled every 6 months of all incidents reported. The report should contain dates when training were conducted and when safety equipment and structures were inspected and maintained.

7.1.7 Fire

Operational activities may increase the occurrence of fires, particularly due to fuel handling, mechanical operations. The airport conducts regular fire drills and maintains a designated fire-fighting training area, which is critical for ensuring readiness among emergency personnel.

Desired Outcome: To prevent property damage, possible injury and impacts caused by uncontrolled fires.

Actions

Prevention:

- Comply with ICAO and ACI regulations taking into consideration the following (amongst others):
  - Fire extinguishers ICAO Doc 7300, Convention on International Civil Aviation.
  - ICAO Doc 9902, Assembly Resolutions in Force (as of 28 September 2007).
- A holistic fire protection and prevention plan is needed. This plan must include an emergency response plan, firefighting plan and spill recovery plan.
- Maintain firefighting equipment, good housekeeping and personnel training (firefighting, fire prevention and responsible housekeeping practices).
- Ensure all fuel or chemicals are stored according to MSDS and SANS instructions.
- Maintain regular site, mechanical and electrical inspections and maintenance.
- Clean all spills / leaks.
- Special note must be taken of the regulations stipulated in sections 47 and 48 of the Petroleum Products and Energy Act, 1990 (Act No. 13 of 1990).
- Follow SANS standards for operation and maintenance of fuel storage facilities.
- Emergency shutoff systems.
- Specially trained aircraft refuelling operators must be utilized.
- The firefighting area must have proper firebreaks where all vegetation is removed from to prevent veld fires from starting. Dense vegetation is normaly not present but may be present after the area received good rain.
- The usage of per- and polyfluoroalkyl substances as a fire suppressant should be discouraged due to their health risk to receptors.
- Maintain sufficient firefighting water storage.
- Proper handling and disposal of pre-boarding confiscated items like lithium batteries and flammable items.

Mitigation:

- Rapid response to any fire incidents is crucial.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Maintain a register of firefighting chemicals in use and it's health risk.
- A register of all incidents must be maintained on a daily basis. This should include measures taken to ensure that such incidents do not repeat themselves.
- A report should be compiled every 6 months of all incidents reported. The report should contain dates when fire drills were conducted and when fire equipment was tested and training given.

7.1.8 Air Quality

The development and operation of an airport cause gaseous and particulate emissions from different sources including aircraft, ground support equipment, airport infrastructure and landside access traffic. Fuel vapours are released into the air during refuelling. Prolonged exposure may have carcinogenic effects. Dust may be generated during maintenance operations and or demolishing activities. The encroachment of township development around the airport is a concern and this will expose such receptors to air emissions. This should be planned for and air quality monitoring might become necessary in future.

Desired Outcome: To prevent health impacts and minimise dust generated.

Actions

Prevention:

- Plan with the Walvis Bay Municipality to ensure buffer zones around the airport.
- An air quality management plan should be drafted, implemented and reported on. The air quality management plan should consider all operations of the airport's emissions generating activities while management measures should include actions that will ensure adherence to ICAO, ACI, WHO and World Bank regulations. Addition guidelines for best practise should be considered. Cognisance should be taken of the following:
  - ICAO's ECO Airport Toolkit: Greenhouse Gas Management and Mitigation at Airports,
  - ICAO's ECO Airport Toolkit: Air Quality Management at Airports,
  - ICAO's ECO Airport Toolkit: Climate Resilient Airports,
  - ICAO Airport Air Quality Guidance Manual (Doc 9889),
  - ICAO Airport Planning Manual (Doc 9184), Part 2, Land Use and Environmental Control Measures,
  - ICAO Operational Opportunities to Reduce Fuel Burn and Emissions (Doc 10013),
  - International Finance Corporation's Environmental, Health and Safety Guidelines for Airports: Waste Management including related performance indicators and monitoring.
- Employees should be coached on the dangers of fuel vapours

Mitigation:

- Personnel issued with appropriate PPE where excessive dust or vapours are present.
- A complaints register should be kept for any dust related issues and mitigation steps taken to address complaints where necessary e.g. dust suppression.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Any complaints received regarding dust or fuel vapours should be recorded with notes on action taken.
- Air quality monitoring should be instigated if regular complaints on air quality are received.
- All information and reporting to be included in a bi-annual report.

7.1.9 Noise

Aircraft noise near most airports is the most consistent environmental issue which impacts on local communities. Airliner operations contribute considerably to noise. Noise pollution will also exist due to heavy motor vehicles accessing the site. Maintenance activities may generate excessive noise. Noise generation by the various activities on site may impact neighbouring receptors (e.g. the Military Base), including on-site tenants and visitors to the airport.

The encroachment of township development around the airport is a concern and this will expose such receptors to noise emissions. This should be planned for and noise monitoring might become necessary in future.

The separation distance between the runway and parallel taxiway does not allow simultaneous movement of landing and taxiing aircraft. This will limit to some extend the number of aircraft operating at the same time.

Desired Outcome: To prevent any nuisance and hearing loss due to noise generated.

Actions

Prevention:

- A noise abatement and management plan should be drafted, implemented and reported on. The noise abatement and management plan should consider all operations of the airport's noise emissions generating activities while management measures should include actions that will ensure adherence to ICAO, ACI, WHO and World Bank regulations. Addition guidelines for best practise should be considered. Cognisance should be taken of the following:
  - International Finance Corporation's Environmental, Health and Safety Guidelines for Airports: Noise and Vibrations including related performance indicators and monitoring.
  - ICAO Guidance Document. The Balanced Approach to Aircraft Noise Management (Doc 9829AN/451) revised edition of 2007.
- Manage the loading / offloading of passengers to not take place while there is excessive nearby jet engine noise.
- All machinery must be regularly serviced to ensure minimal noise production.
- Plan with the Walvis Bay Municipality to ensure buffer zones around the airport.

Mitigation:

- Close collaboration of the airport, the air navigation service provider and the airlines.
- Hearing protectors as standard PPE for workers in situations with elevated noise levels.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Labour Act, WHO & Walvis Bay Municipality Guidelines.
- Maintain a complaints register and instigate noise level monitoring if required.
- Bi-annual report on complaints and actions taken to address complaints and prevent future occurrences.

7.1.10 Radioactive Materials Management

Some of the security equipment used within the airport utilises radiation-based equipment. These systems include both ionizing and non-ionizing radiation technologies. Ionizing radiation, like X-rays, is used for scanning luggage to detect prohibited items. Non-ionizing radiation, such as electromagnetic waves, is used in whole-body scanners to detect concealed items on passengers.

In addition, radioactive source material may, at times be transported via airfreight. All such material will enter the airport and will also have to be handled at the facility.

Desired Outcome: To ensure the safe operation and maintenance / disposal of equipment, or material which emit radiation or employ radiation technologies. To safeguard employees and the public from radiation that exceeds the regulatory limit, as well as to prevent environmental contamination.

Actions

Prevention:

- Obtain and adhere (to any conditions) of a license for the use of radiation sources to search persons, or to detect the presence of any object or substance in the possession of a person for security or other similar purposes; as obtained from the National Radiation Protection Authority.
- A radiation management plan (RPM) should be kept on site. The plan should adhere to all the national and international requirements related thereto. At a minimum the RPM should comply with the Radiation Protection and Waste Disposal Regulations: Atomic Energy and Radiation Protection Act, 2005 (Act No. 5 of 2005) as well as guidelines of the International Atomic Energy Agency (IAEA).
- All reporting regarding the implementation of the RPM should, at a minimum include the aspects detailed in the Guide to Facilitate the Reporting by Licensees on the Implementation of the RMP, which was developed by the Namibian National Radiation Protection Authority.
- All radioactive waste should be separated, managed and disposed of, as detailed in the RPM which should have a dedicated radioactive waste management and disposal chapter. Requirements should include at a minimum:
    - Regular disposal at appropriately classified disposal facilities.
    - Liaison with the local municipality regarding waste and handling of hazardous and potentially radioactive waste.
- An emergency response plan based on the RPM should be drafted and employees trained for any related emergency.
- Ensure that any shipment of radioactive source material, and persons involved with the shipment, are aware of, and have agreed to the RPM, and in particular aspects related to the transport of radioactive material.

Mitigation:

- Communicate any potential risk to employees, the public and authorities, should any incident occur to expose employees or the public to unacceptable limits of radiation.
- Apply applicable warning signage.
- Contact equipment manufacturers for assistance and or guidance related to the management and or disposal of equipment which utilises radiation sources.

Responsible Body:

- Proponent
- Contractors
- Patrons (Freight services related to the shipment of radioactive materials)

Data Sources and Monitoring:

- Implementation records of the RPM kept on file.

- An annual report by the end of March must be submitted to the Namibian National Radiation Protection Authority, covering all activities that involved the handling of radioactive material. The record should include, at a minimum:
  - Report on the theft of any radioactive waste.
  - Report any accidents and inappropriate radioactive waste management practices.
  - A register any of incident that occurred during handling and transportation and action taken to prevent future incidents.
  - Keep a record of training received on radioactive waste handling and transport.

7.1.11 Waste Production

Various waste streams result from the operational and possible construction and maintenance activities. Waste may include hazardous waste associated with hydrocarbon products and chemicals, as well as soil and water contaminated with such products. Construction waste may include building rubble and discarded equipment. Domestic waste will be generated by travellers and employees on the airport.

Desired Outcome: To reduce the amount of waste produced, and prevent pollution and littering. The introduction of diseases and pests from foreign flights must be prevented.

Actions

Prevention:

- A waste management plan should be drafted, implemented and reported on. The waste management plan should consider all operations of the airport's waste streams while management of the different waste streams should include measures that will ensure adherence to ICAO, ACI, WHO and World Bank regulations. Addition guidelines for best practise should be considered. Cognisance should be taken of the following:
  - ICAO's ECO Airport Toolkit: Waste Management at Airports;
  - ICAO's ECO Airport Toolkit: Addressing Single-Use Plastics: an Overview for Aviation,
  - International Finance Corporation's Environmental, Health and Safety Guidelines for Airports: Waste Management including related performance indicators and monitoring.
- Waste reduction measures should be implemented and all waste that can be re-used / recycled must be kept separate.
- Ensure adequate disposal storage facilities are available.
- International waste originating from international flights should be handled separately and disposed of as hazardous waste or treated on site. This is to prevent the introduction of foreign diseases from contaminated food and confiscated plant and animal products.
- Ensure waste cannot be blown away by wind.
- Prevent scavenging (human and non-human) of stored waste.

Mitigation:

- Waste should be disposed of regularly and at appropriately classified disposal facilities.
- Hazardous waste sorted separately and disposed at Class 1 disposal site (catering solid waste, empty chemical containers, contaminated rugs, paper water and soil, airside and landsite vehicle waste). Liaise with the municipality regarding waste and handling of hazardous waste. Hazardous waste include old x-ray machines which contains radioactive material must be disposed of appropriately.
- See the material safety data sheets available from suppliers for disposal of contaminated products and empty containers.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- A register of hazardous or dangerous waste disposal should be kept. This should include type of waste, volume as well as disposal method/facility.
- Any complaints received regarding waste should be recorded with notes on action taken.
- All information and reporting to be included in a bi-annual report.

7.1.12 Ecosystem and Biodiversity Impact

Some elements of wildlife hazard to the safety of aviation will always remain, despite dissuasive environmental measures. The airport infrastructure establishes potential shelter environment for fauna such as birds, small mammals and reptiles. Treated sewage water release on the neighbouring land enhances the chances for bird strikes on the runway. The airport is fenced off, however large fauna could potentially penetrate the perimeter fence and enter the premises. Other impacts are mostly related to pollution of the environment. This could have a downstream cumulative effect on the ecosystem and biodiversity.

Desired Outcome: To prevent wildlife conflict, avoid pollution of and impacts on the ecological environment.

Actions

Mitigation:

- A wildlife hazard management plan should be drafted, implemented and reported on. The wildlife hazard management plan should consider all operations of the airport which may be affected by wildlife, while management measures should include actions that will ensure adherence to ICAO, ACI, WHO and World Bank regulations. Addition guidelines for best practise should be considered. Cognisance should be taken of the following:
  - This is also referred to in the Civil Aviation Safety Regulations Part 139 (Aerodromes) Manual of Standards (MOS) as a "wildlife hazard management plan".
  - Doc 9137 Airport Services Manual Part 3 - Wildlife Hazard Management Fifth Edition, 2020.
  - ICAO: Aviation Taking Action Against Wildlife Trafficking (2022).
  - ICAO: Wildlife Management Basics (2011).
- Compile a biodiversity action and rehabilitation plan which should be reported on, The Plan should consider existing aspects affecting biodiversity and outline how rehabilitation and restoration of degraded areas will be achieved.
- Report any extraordinary sightings to MEFT.
- Mitigation measures related to waste handling and the prevention of groundwater, surface water and soil contamination should limit ecosystem and biodiversity impacts.
- Minimize the establishment of habitats or nesting sites within the facility, particularly near the runway, open fields, and waste storage areas.
- Avoid attraction and scavenging of waste by fauna.
- Regular fence patrolling to ensure its integrity and identify animals that may have breached.
- Employees working in areas with a high snake presence risk must be provided with adequate PPE.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Record any incidents and extraordinary faunal sightings.
- All information and reporting to be included in a bi-annual report.

7.1.13 Groundwater, Surface Water and Soil Contamination

Operations entail the storage and handling of hydrocarbons will present a contamination risk. Contamination may either result from failing storage facilities, pumps and pipelines, or spills and leaks associated with overfilling or human error. Pollution due to sewerage system overflow or leakage may further put the groundwater at risk. Such spills may contaminate surface water, soil and groundwater. Contaminated soil at the firefighting training facility and around fuel handling and storage facilities should be rehabilitated.

Desired Outcome: To prevent the contamination of water and soil.

Actions

Prevention:

- A surface- and stormwater management plan should be drafted, implemented and reported on. The plan should consider all operations of the airport which may be affected by stormwater or surface water, while management measures should include actions that will ensure adherence to ICAO, ACI, WHO and World Bank regulations. Addition guidelines for best practise should be considered. Cognisance should be taken of the following:
  - International Finance Corporation's Environmental, Health and Safety Guidelines for Airports: Stormwater and Wastewater including related performance indicators and monitoring.
  - ICAO, Eco-Airport Toolkit, Water Management at Airports.
- Chemicals must be stored and handled as per relevant material safety data sheets.
- Spill control structures and procedures must be in place according to SANS standards or better and spill control infrastructure available for all surfaces where fuel is stored or handled.
- Aircraft effluent disposal must be disposed of into a formal disposal facility with spill control that prevents surface runoff from entering the sewage system and that prevents soil pollution.
- All fuelling should be conducted on surfaces provided for this purpose. E.g. Concrete slabs with regularly maintained seals between slabs.
- The procedures followed to prevent environmental damage during service and maintenance, and compliance with these procedures, must be audited and corrections made where necessary.
- Proper training of operators must be conducted on a regular basis (fuel handling, spill detection, spill control).
- All fuel lines and tanks must be tested for leaks (line integrity test) at least once a year.
- Remove litter from stormwater catchment pits and outflow areas.

Mitigation:

- Any fuel spillage of more than 200 litre must be reported to the Ministry of Industries, Mines and Energy.
- Spill clean-up means must be readily available on site as per the relevant MSDS.
- Any chemical spill must be cleaned up immediately.
- Stormwater outflow areas must be regularly inspected and litter and contamination removed.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- A report should be compiled bi-annually of all spills or leakages reported. The report should contain the following information: date and duration of spill, product spilled, volume of spill, remedial action taken, comparison of pre-exposure baseline data (previous pollution conditions survey results) with post remediation data (e.g.

soil/groundwater hydrocarbon concentrations) and a copy of documentation in which spill was reported to Ministry of Industries, Mines and Energy.

- Regular stormwater outflow inspections and observations. At least monthly sewage outflow water quality monitoring.
- Keep fuel line and tank integrity test results on file.
- All information and reporting to be included in a bi-annual report.

7.1.14 Visual Impact

This is an impact that not only affects the aesthetic appearance, but also the integrity of the facility. The airport has been operational since the 1940's and has since formed part of the landscape character. However, some obsolete infrastructure remains on site, which may be unsightly and detracts from the overall visual quality.

Desired Outcome: To minimise aesthetic impacts associated with the facility, as well as maintain the structural integrity.

Actions

Mitigation:

- Regular waste disposal, good housekeeping and routine maintenance on infrastructure will ensure that the longevity of structures are maximised and a low visual impact is maintained.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- A report should be compiled every 6 months of all complaints received and actions taken.

7.1.15 Cumulative Impact

Possible cumulative impacts during operations mainly involve increased traffic on the C14 road and within the airport, affecting traffic flow. Noise, waste, and sewage levels will also rise with increased activity. Additionally, air quality may be impacted, with airports encouraged to provide "green fuel" options where possible to reduce emissions.

Desired Outcome: To minimise cumulative impacts associated with the airport.

Actions

Mitigation:

- Addressing each of the individual impacts as discussed and recommended in the EMP would reduce the cumulative impact.
- Reviewing biannual and annual reports for any new or re-occurring impacts or problems would aid in identifying cumulative impacts and help in planning if the existing mitigations are insufficient.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Bi-annual summary report based on all other impacts must be created to give an overall assessment of the impact of the operational phase.

7.2 DECOMMISSIONING AND REHABILITATION

Decommissioning is not anticipated during the validity of the Environmental Clearance Certificate but has been assessed. Should decommissioning occur, it will involve the complete removal of all infrastructure, including buildings and underground services. Any pollution on site must be remediated. Noise and waste generation during dismantling are expected impacts; noise levels must comply with WHO standards, and waste must be properly contained and disposed of at licensed facilities, avoiding any dumping in surrounding areas. Future land use should be evaluated before decommissioning, and rehabilitation initiated if the land is not to be reused. This includes the remediation or removal of obsolete infrastructure to restore the site appropriately. The facility's Environmental Management Plan (EMP) will require review at decommissioning to reflect site changes and implement necessary mitigation measures.

Some of the outdated buildings such as redundant hangars, storage sheds, and auxiliary service rooms are earmarked for demolition. These structures no longer meet current safety or operational standards and their removal will facilitate more efficient use of space and improve overall site safety. The presence of asbestos in the building material should be checked for prior to demolition as some of the structures might date back to times when asbestos material was used for construction.

7.3 ENVIRONMENTAL MANAGEMENT SYSTEM

The Proponent could implement an Environmental Management System (EMS) for their operations. The ICAO's ECO Airport Toolkit includes a guideline document for an Environmental Management System for Airports while such a system is also mentioned in the ICAO's Airport Planning Manual (Part 2) (ICAO Doc 9184) Section 3.3 as well as ICAO's Report on Environmental Management System Practices in the Aviation Sector (Doc 9968).

An EMS is an internationally recognised and certified management system that will ensure ongoing incorporation of environmental constraints. At the heart of an EMS is the concept of continual improvement of environmental performance with resulting increases in operational efficiency, financial savings and reduction in environmental, health and safety risks. An effective EMS would need to include the following elements:

- A stated environmental policy which sets the desired level of environmental performance;
- An environmental legal register;
- An institutional structure which sets out the responsibility, authority, lines of communication and resources needed to implement the EMS;
- Identification of environmental, safety and health training needs;
- An environmental program(s) stipulating environmental objectives and targets to be met, and work instructions and controls to be applied in order to achieve compliance with the environmental policy; and
- Periodic (internal and external) audits and reviews of environmental performance and the effectiveness of the EMS.
- The EMP.

8 CONCLUSION

The Walvis Bay International Airport remains an important gateway to Namibia and the central coastal region, facilitating domestic, regional and international flights. The influx of airline passengers and cargo through the airport plays a crucial role in the business and tourism sector in the country as a whole. The growing demand for the airport and its services makes it a necessity to increase its operational efficiency and capacity in order to accommodate the projected increase of passenger traffic. The airport has a large workforce and contribute to skills transfer and training which in turn develops the local workforce during airport operations.

Positive and negative impacts will occur at the airport. Most of the impacts can successfully be mitigated. Complying with Namibian legislation and with policies and recommendations of leaders in the aviation/airport industry such as ICAO, ACI, WHO and World Bank guidance documents, negative

impacts can be mitigated or prevented. SANS standards relating to the petroleum industry and prescribed by Namibian law must be followed for all fuel storage and handling at the airport. Noise pollution should at all times meet the prescribed Walvis Bay Municipality, ICAO, ACI and WHO requirements to prevent hearing loss and not to cause a nuisance. During landing and take-off short term elevated noise levels will be experienced which cannot be mitigated. Fire prevention should be adequate, and health and safety regulations should be adhered to in accordance with the regulations pertaining to relevant laws and internationally accepted standards of operation.

The EMP (Section 7) should be used as an on-site reference document for the operations of the facility. Parties responsible for transgressing of the EMP should be held responsible for any rehabilitation that may need to be undertaken. The Proponent use an in-house Health, Safety, Security and Environment Management System in conjunction with the EMP. All operational personnel must be taught the contents of these documents.

Should the Directorate of Environmental Affairs find that the impacts and related mitigation measures, which have been proposed in this report, are acceptable, an environmental clearance certificate may be granted to Namibia Airports Company. The ECC issued, based on this document, will render it a legally binding document which should be adhered to. Focus could be placed on Section 7 of this report, which includes an EMP for this project. It should be noted that the assessment process's aim is not to stop operations of the facility, or any of its components, but to rather determine its impact and guide sustainable and responsible development as per the spirit of the EMA.

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