



“Balancing Growth with Resilience”

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Subdivision: Creation of Public Roads (Portions 180 and 181 of Remainder of Portion B of Swakopmund Town and Townlands No.41 into 12 Portions and Remainder), Swakopmund, Erongo Region, Namibia

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Swakopmund Smallholdings Potable Water Reservoir Environmental Impact Assessment

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Environmental pollution is not only humanity's treason to humanity but also a treason to all other living creatures on earth! – Mehmet Murat ildan

1. INTRODUCTION

1.1 Background Information

The Municipality of Swakopmund is proposing to Construction of the Swakopmund Smallholdings Potable Water Reservoir on Remainder of Portion 79 of the Swakopmund Town & Townlands 41.

The Environmental Management Plan involves risk management strategies that should be undertaken by the Project proponent and the Project manager to mitigate environmental degeneration. They are approaches to monitor, control, reclaim and restore the environment back to its appropriate state. EMPs for Project thus provide logical frameworks within which the identified issues of environmental concern can be mitigated, monitored and evaluated. Environmental monitoring involves measurement of relevant parameters, at a level of details accurate enough, to distinguish the anticipated changes.

Monitoring aims at determining the effectiveness of actions to improve environmental quality. The environmental management and monitoring plans have been developed and outlined to bring home the key findings of the Environmental Impact Assessment of the Project in mention, recommending necessary mitigation actions, defining roles, monitor able indicators and the estimated cost. The EMPs outlined in tables hereafter address the potential negative impacts and mitigation measures as well as roles, costs and monitor able indicators that can help to determine the effectiveness of actions to upgrade the quality of environment; as regards the proposed project. The EMPs have considered construction, operation and decommissioning phase.

As per the Environmental Management Act (7 of 2007), the development cannot take place without Environmental Impact Assessment having been completed and Environmental Clearance Certificate issued from the Directorate of Environmental Affairs (MET).

1.2 Scope of an Environmental Management Plan

Environmental Management Plan during Construction, Operation and Decommissioning phases of the project. An EMP is a site-specific plan developed to ensure that all necessary measures are identified and implemented in order to protect the environment and comply with environmental legislation (Landcom, 2014).

It provides the answers to the following important questions:

- What are the likely environmental issues for the site?
- What likely harm these issues can cause to the surrounding environment?
- How will you manage these issues to minimize harm to the environment?

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An EMP is one of the most important products of an Environmental Assessment (EA) process. An EMP synthesises all recommended mitigation and monitoring measures, laid out according to the various stages of a project life cycle, with clearly defined follow-up actions and responsibility assigned to specific actors. This EMP is a legally binding document and has been drafted in accordance with the Namibian Environmental Management Act (No. 7 of 2007) and its Environmental Impact Assessment Regulations (2012). This plan describes the mitigation and monitoring measures to be implemented during the following phases of these developments:

- **Planning and Design** – the period, prior to the drafting of construction tender documents, during which preliminary legislative and administrative arrangements, necessary before any erven are sold, are made and detailed engineering designs/drawings are carried out;
- **Construction Tender Preparation** – the period during which the proponent, having secured the necessary legislative and administrative arrangements, prepare construction tender documents for the development of services infrastructure to service the various erven as well as any other construction process(s) within the development areas;
- **Construction** – the period during which the services infrastructure will be constructed to service the various erven within the proposed townships and subdivided areas; and
- **Operation and Maintenance** – the period during which the services infrastructure will be fully functional and maintained by the local authority.

The commitments described here form part of the Environmental Clearance Certificate (ECC) between Welwetsia Investments and the state, as represented by the Ministry of Environment and Tourism (MET). Non-compliance is considered illegal and may have legal consequences. The amendment, transfer or renewal of the ECC should be communicated to the Environmental Commissioner as stipulated in the Environmental Management Act (EMA) of 2007 (S 39-42) and its EIA Regulations (S 19-20). Any changes to this EMP will require an amendment to the ECC for these developments.

1.3 The Purpose of this Environmental Management Plan

The 2012 EIA Regulations define a '**Management Plan**' as "*...a plan that describes how activities that may have significant environments effects on the environment are to be mitigated, controlled and monitored.*" The EMP has been included in the part of EIA Report to provide a link between the impacts identified in the EIA Process and the required environmental management on the ground during project implementation and operation. The purpose of this document is to guide environmental management throughout the proposed project development.

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The Environmental Management Act no.7 of 2007 requires each development project in Namibia to conduct an Environmental Impact Assessment after which an Environmental Management Plan is to be prepared.

The principles envisaged by the Namibian Environmental Management Act 7 of 2007 stipulate that:

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

The principles above apply to all activities that have an impact on the natural environment, and these principles must be mandatorily adhered to by both Government and individuals and institutions.

In terms of the Namibian Environmental Impact Assessment (EIA) Regulations (Government Notice (GN) 28, 29, and 30 promulgated on 6 February 2012) enacted in terms of the Namibian Environmental Management Act (Act no. 7 of 2007) (EMA), the proposed project triggers Activities 1(a; b), 5.1 (c), 8.1, 8.8, 8.9 and 10.1 in terms of Regulation GN 29. As the proposed project triggers activities listed in terms of the Regulations, it is necessary to apply to the Ministry of Environment and Tourism: Directorate of Environmental Affairs (MET: DEA) for authorization by way of an Environmental Clearance Certificate (ECC).

The EIA process comprised a full Scoping process that included an assessment of all potential environmental impacts as identified through the process. Section 8 (j) of the EIA Regulations require that a draft EMP is submitted as part of the Scoping Report so that these documents can be considered simultaneously.

Figure 1: Google Map of the identified site, Portion 79 of Swakopmund Town & Townlands 41



2. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN IN DETAIL

Table 2.1 below presents the Monitoring Indicators, Reporting Frequency and Person Responsible for each mitigation measure identified for the project.

Table 7 - Environmental Management and Monitoring Plan

Environmental Component and Activity	Mitigating Measure(s)	Monitoring Indicator(s)	Data Collection and Reporting Frequency	Responsible
Construction of a temporary site offices and lay down area may have a limited impact on the topography	Limit earthworks to the minimum required for the proposed facilities such as site office	Earthwork quantities optimization	Prior to commencing earthworks	Construction Manager
Commercial activities hindered because of the difficulty of access	Local residents should be employed during the construction phases wherever feasible	Number of local residents employed	Prior to and during construction	Construction Manager
Water for wash down of vehicles and machinery on site may contaminate groundwater	Provision of uncontaminated water for dust suppression and wash down of vehicles and machinery	Water quality for dust suppression	Bi - Weekly	Site Supervisor
Spills or leaks of fuels, lubricants or chemicals from machinery and vehicles may contaminate groundwater	Spill control measures should be implemented to prevent spills from infiltrating into the groundwater table. Measures should include appropriate materials handling and storage procedures, and development of contingency plans in the event of a spill	Correctness of procedures and plans	Prior to commencing construction	Health Officer Water/Sanit ation Officer

Environmental Component and Activity	Mitigating Measure(s)	Monitoring Indicator(s)	Data Collection and Reporting Frequency	Responsible
Noise pollution during construction	Make sure all machinery and vehicles are fitted with appropriate mufflers, and that all mufflers and acoustic treatments are in good working order;	Visual inspections Noise level	Prior to construction and update as required	Site Supervisor
	Make sure all machinery and vehicles are regularly maintained and broken parts (such as mufflers) are replaced immediately	Visual inspections Noise level	Daily	Site Supervisor
	Make sure all machinery and vehicles are operated efficiently and according to the manufacturers specifications, by trained and qualified operator	Visual inspections Noise level	Prior to construction	Site Supervisor
	Make sure that activities likely to cause adverse noise impacts are timed to have least impact on surrounding land users and other site activities (such as the schools and the hospitals)	Noise level	Daily/Weekly	Construction Manager Site Supervisor
	Make sure all personnel are issued with hearing protection and are advised of its proper use	Visual inspections Noise level	Daily/weekly	Safety Engineer
	Consultation of earthwork hours with affected residents and nearby sensitive receivers	Noise level at different times Residents feedback	Prior to and during construction	Construction Manager
Inadequate storage and management of litter, construction waste and liquid wastes prior to disposal	Waste management measures should be implemented to prevent litter and debris and liquid wastes from entering soil excavations	Visual inspections of site	During construction	Health Officer Water/Sanitation Officer

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Environmental Component and Activity	Mitigating Measure(s)	Monitoring Indicator(s)	Data Collection and Reporting Frequency	Responsible
Effluent from construction workers' temporary amenities leaching into groundwater, carrying nutrients and micro-organisms	Provision of temporary amenities for workers. Effluent should be treated or suitably disposed off-site	Efficiency of provided amenities	Prior to commencing construction	Health Officer Water/Sanitation Officer
Contamination of the storm water from litter and construction wastes and untreated effluent from temporary workers' amenities	Waste control measures should be implemented to prevent litter and construction waste from infiltrating into the groundwater table	Efficiency of proposed measures	Prior to commencing construction	Health Officer Water/Sanitation Officer
	Provision of suitable workers' amenities facilities. If possible, effluent should be disposed of off-site at a nearby STP	Efficiency of provided amenities	Prior to commencing construction	Health Officer Water/Sanitation Officer
High volume of excavation and filling may alter flow paths within the portions under construction	Re-use any excess excavation material generated by the construction within the site or on the other nearby projects. The deposit of waste to landfill is a last resort.	Location and quantities of cut and fill volumes	During construction	Construction Manager Site Supervisor
	Reduce as much as possible difference between cut and fill	Cut and fill volumes	Before construction	Design Engineer
Odor generated from sewer of worker's amenities	Provision of suitable workers' amenities, located within the construction area and, if possible, downwind from residential areas	Efficiency of provided amenities	Prior to commencing construction	Health Officer Water/Sanitation Officer Site Supervisor

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Environmental Component and Activity	Mitigating Measure(s)	Monitoring Indicator(s)	Data Collection and Reporting Frequency	Responsible
	Regular maintenance of workers' amenities, including the emptying of effluent storage tanks	Efficiency of provided amenities	Prior to and during construction	Health Officer Water/Sanitation Officer Site Supervisor
Traffic congestions	Provision of shared worker's transport from workers accommodation to the proposed Project site	Number of vehicles required to transport workers	Daily/Weekly	Site Supervisor
	Installation of warning signs and specified speed limits (site roads should reduce traffic speeds to 20 km/hr)	Efficiency of signs location	Prior to commencing construction	Site Supervisor
	The use of local construction materials where practical to avoid long journeys	Number of local suppliers involved compared to non-local construction materials	Prior to and during construction	Construction Manager
	Provision of adequate lighting on site road and parking areas	Efficiency of light distribution and intensity	Prior to and during construction	Site Supervisor
	Timing of construction activity, such as restricting construction traffic to designated roads during designated times, avoiding peak hour traffic	Traffic level of service	Prior to and during construction	Construction Manager

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Environmental Component and Activity	Mitigating Measure(s)	Monitoring Indicator(s)	Data Collection and Reporting Frequency	Responsible
	Design a Traffic Plan to make sure that traffic avoids, where possible, congested and heavily populated areas and dusty roads	Traffic level of service	Prior to and during construction	Traffic Engineer
Heavy noises near learning institutions can affect learning	Construction works within 100m of schools should be restricted to outside learning institutions (such as before and after school, during school holidays or weekends, or left as the final stage of works); Wire fence meshing, dust screens or wooden hoardings should be installed to delineate the construction area and therefore decrease impacts; The access points for construction vehicles should be a minimum of 100m from school access	Noise levels School feedback	Prior to and during construction	Construction Manager Site Supervisor
Dust emissions generated from earthworks due to loading and unloading of materials on site and from uncovered truckload in addition to the potential dust emissions that could occur as a result of 4km of excavation for the water supply network	Minimizing the height and slope of stockpiles to ensure erosion of unconsolidated materials during rainfall events does not occur	Visual inspections	Prior to commencing construction	Site Supervisor
	Side enclosure and covering, by impervious sheeting, of any aggregate or other dusty material stockpiles	Visual inspections	Prior to commencing construction	Site Supervisor
	Dusty vehicle loads transported to, from and within the Project site should be covered by sheets and should not be overloaded	Visual inspections	Daily/Weekly	Site Supervisor
	Use of water sprays to decrease dust generation	Visual inspections	Daily	Site Supervisor

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Environmental Component and Activity	Mitigating Measure(s)	Monitoring Indicator(s)	Data Collection and Reporting Frequency	Responsible
Contamination of storm water from exposed soils sediments	The height and slope of stockpiles should be limited to minimize erosion of unconsolidated materials during rainfall events	Visual inspections	Daily checks of the location of the stockpiles	Site Supervisor
	Locating stockpiles on flat areas, away from storm water. Ensure that sediment or erosion cannot reach a waterway; Diversion of overland flow around work areas / construction sites	Visual inspections	Daily checks of the location of the stockpiles	Site Supervisor
Generation of excavation material to be disposed of	Re-use of excavated material for the project or other projects in the area	Visual inspections	Daily checks of the generated excavation material and its disposal	Site Supervisor
Potential public safety concerns associated with the excavation works for the installation of the water supply network	The area surrounding the excavations should be fenced off or otherwise restricted from public access to prevent injury or accident due to entry onto a construction site	Visual inspections	Daily checks of the access restriction signboard or fence	Site Supervisor
Potential worker accidents from constructing manholes	Following mitigation measures are recommended for the prevention of gas emissions	Efficiency of mitigation measure for gas emissions prevention	Prior to and during construction	Safety Engineer
Generation of debris to be disposed outside the project site	Solid waste that cannot be re-used shall be disposed of in approved landfills	Visual inspections	Daily checks of the generated excavation material and its disposal	Site Supervisor

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Environmental Component and Activity	Mitigating Measure(s)	Monitoring Indicator(s)	Data Collection and Reporting Frequency	Responsible
Dust emissions during breaking of concrete that might affect workers health	Use of water sprays to decrease dust emissions	Visual inspections	Daily	Site Supervisor
Adverse impact on the health of the workers and residents in and around the due to deterioration of the air quality, increase of noise and traffic	Implement the air quality, noise and traffic mitigation measures as described in the <small>relevant sections</small>	Efficiency of assigned mitigation <small>measures</small>	Prior to and during construction	Safety Engineer Site Supervisor
Volatile emissions during earthwork phase from solvents and fuels stored or used on the Project site	Ensure all machinery is in good order and repair and not leaking fuel or volatile emissions from fuel tanks or fuel lines	Visual inspections	Daily/Weekly	Site Supervisor
	A full list of all volatile fuels and chemicals stored on site should be kept by the site supervisor, including accompanying volumes, locations and Material Safety Data Sheets (MSDSs)	List of volatile fuels and chemicals	Update the register as necessary	Site Supervisor
Exhaust and dust emissions from construction vehicles and machinery	Use of modern machinery, with adequate pollution control devices. Regular maintenance and inspection programs for all construction vehicles.	Visual inspections	Daily	Construction Manager Site Supervisor
	Proper and efficient operation of construction machinery and vehicles by qualified workers	Workers qualifications Visual inspections	Prior to commencing construction	Construction Manager Site Supervisor

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Environmental Component and Activity	Mitigating Measure(s)	Monitoring Indicator(s)	Data Collection and Reporting Frequency	Responsible
	Regular maintenance and inspection program for all construction vehicles	Maintenance and inspection program efficiency and implementation	In accordance with manufacturer requirements	Construction Manager Site Supervisor
	Minimize unnecessary operation of construction machinery, including efficiency of trip times and reduction of double handling through appropriate placement of stockpiles, haul roads, work depots and work areas	Optimized total expected trip time compared to usual total trip time	Prior to construction	Site Supervisor Traffic Engineer
	Daily visual checks to ensure the above points are followed, particularly in regards to smoke emissions from vehicles and plants. Equipment generating smoke should be given defect notices and taken out of service until repaired and approved for re-deployment by site supervisor.	Visual checks	Daily	Health Officer
Visual effect on aesthetics	Design facilities' facades in a subtle way that matches its surroundings and reduce their size as much as possible to minimize the potential negative effects on aesthetics.	Façade design	Prior to construction	Design Engineer
Use of potentially harmful materials (e.g. PCB)	Limit use of harmful materials. If unavoidable, impose monitoring and maintenance	Amount of harmful materials used	Weekly	Health Officer Site Supervisor

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Environmental Component and Activity	Mitigating Measure(s)	Monitoring Indicator(s)	Data Collection and Reporting Frequency	Responsible
Improper chlorination dosage may alter water quality	Regular monitoring of water content and of chlorination performance	Water quality tests Arsenic <0.01 mg/L Lead <0.01 mg/L Total coli forms not detectable in any 100 ml sample Copper <2 mg/L Nitrate <50 mg/L Nitrite <0.2 mg/L Fluoride <1.5 mg/L	Daily	Health Officer Water/Sanitation Officer
Water drawdown	Control water extraction to match as close as possible the groundwater recharge rate	Amount of water being extracted	Bi-weekly	Water/Sanitation Officer
Unsustainable water use	Water extraction monitoring	Amount of water being extracted	Bi-weekly	Water/Sanitation Officer
	Sensitize and educate the beneficiaries/refugees on the need to conserve water and promote best practices in the use of water	Amount of water being extracted Beneficiaries/refugees/IDPs feedback and reaction	Biannual	Health Officer Water/Sanitation Officer
	Improved irrigation practices	Amount of water being used for irrigation	Quarterly	Water/Sanitation Officer
Decrease in water available for existing flora and fauna in the Swakop-Khan River Basin	Control water extraction to match as close as possible the groundwater recharge rate	Amount of water being extracted	Bi-weekly	Water/Sanitation Officer

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Environmental Component and Activity	Mitigating Measure(s)	Monitoring Indicator(s)	Data Collection and Reporting Frequency	Responsible
Effects on the current fishing activities	Control water extraction to match as close as possible the groundwater recharge rate	Amount of water being extracted	Bi-weekly	Water/Sanitation Officer
Effects on the sensitive ecosystem	Minimize habitat loss due to construction activities	Visual inspection	Prior to construction	Design Engineer / Construction Manager/ Site supervisor
Backwash water to be disposed of without treatment	Recycle backwash water to the treatment plant inflow water or use in irrigation and/or firefighting	Visual inspections	Daily	Operation manager / Health Officer Water/Sanitation Officer
Risk of wrong chlorination dosage	Regular monitoring of water content and of chlorination performance	Monitoring sensors	Daily	Operation manager
Potential hazard from the use of chlorine	Regular monitoring of chlorination performance and appropriate disposal of wastes	Monitoring sensors	Daily	Operation manager
Chemicals coagulation, settled water from pre-sedimentation	Empty sedimentation pond more frequently and dispose solid waste at specified landfills	Visual inspections	Biannual	Operation manager / Health Officer Water/Sanitation Officer
Halted operation due to electricity cuts	Use backup sources of power (e.g. traditional, renewable, etc.)	Hours of electricity cuts per day	In case of power cuts	Local authorities

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Environmental Component and Activity	Mitigating Measure(s)	Monitoring Indicator(s)	Data Collection and Reporting Frequency	Responsible
Pollution in case generators are needed	Use double hulled storage tanks for fuel	Hours per day during which generator is being used	Always	Contractor
Contamination of water due to spills and propagation of chemical elements (e.g. PCB, oil, etc.)	Store chemicals in a contained location with no drainage connection to the water network	Water quality tests Arsenic <0.01 mg/L Lead <0.01 mg/L Total coli forms not detectable in any 100 ml sample Copper <2 mg/L Nitrate <50 mg/L Nitrite <0.2 mg/L Fluoride <1.5 mg/L	Always	Health Officer Water/Sanitation Officer
	Ensure that transformers are located on impermeable and contained surfaces	Location of transformers Type of surfaces on which transformers are located	Before construction	Hydrogeologist
Risk of leakage from fuel storage tanks	Cover area where fuel storage tank is located with impervious material to limit leakage to groundwater	Visual inspection	Prior to construction/ during operation	Site supervisor / Operation manager
Noise pollution during operation	Plant trees and shrubs around facility and fitting of mufflers on equipment	Trees layout, number and height	At the end of construction	Landscape Engineer

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Environmental Component and Activity	Mitigating Measure(s)	Monitoring Indicator(s)	Data Collection and Reporting Frequency	Responsible
Aesthetic issue	Plant trees and shrubs around facility	Trees layout, number and height	At the end of construction	Landscape Engineer
Additional use of energy to operate the facility (electricity)	Use alternate sources of energy such as solar power	Visual inspection	Prior to construction / during operation	Design Engineer
Deterioration of landscape (trees and plants) that exists at the proposed new site location	Plant palm trees and shrubs around facility	Trees layout, number and height	At the end of construction	Landscape Engineer

The only way forward, if we are going to improve the quality of the environment, is to get everybody involved.
– Richard Rogers

3. CONCLUSIONS

After a thorough investigation of the environmental impacts, it can be concluded that the physical and biophysical features will not be impacted significantly on the long term. Short term impacts on noise, air quality and other physical features will be mitigated during construction. The only long term impact on Potable Water Reservoir is a positive one which is the increase in water supply to the population, the expansion in area coverage and the amelioration of the drinking water quality in Swakopmund.

Monitoring and proper employment of the Environmental Management Plan are necessary during construction and operation of the Potable Water Reservoir.