APP: 00266

UPDATED

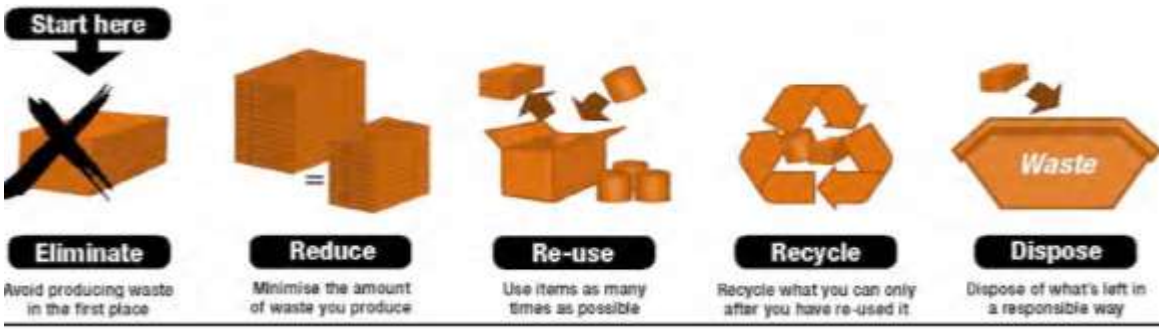
ENVIRONMENTAL MANAGEMENT PLAN (EMP) FOR THE OPERATION AND MANAGEMENT OF THE EXISTING SOLID WASTE DISPOSAL SITE AT OKOMBAHE, ERONGO REGION

Erongo Regional Council

Private Bag 5019

Swakopmund

October 2022



DOCUMENT DESCRIPTION

PROJECT NAME	**EXISTING SOLID WASTE DISPOSAL SITE, OKOMBAHE, ERONGO REGION**
DOCUMENT TYPE	**ENVIRONMENTAL MANAGEMENT PLAN (EMP)**
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UPDATED	**October 2022**

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LIST OF ACRONYMS

DEA	Directorate of Environmental Affairs
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
ERC	Erongo Regional Council
GPS	Global Positioning System
ISWMS	Integrated Solid Waste Management Strategies
MAWF	Ministry of Agriculture Water and Forestry
MET	Ministry of Environment and Tourism
MoHSS	Ministry of Health and Social Service
MURD	Ministry of Urban and Rural Development
NSWMS	National Solid Waste Management Strategies
PCWMP	Pollution Control and Waste Management Policy
SWMU	Solid Waste Management Unit

1. INTRODUCTION AND BACKGROUND

1.1 Introduction

Rapid population growth and urbanization in developing countries have led to the generation of enormous quantities of solid waste and consequential environmental degradation. These waste are disposed in open dumps creating considerable nuisance and environmental problems. Hence, solid waste management has become one of the most important municipal services for any town in order to address waste problems and ensure hygienic conditions for its residents. The most important advantage of operating a formal waste disposal site is that the town has a specific location for disposal that can be monitored and waste can also be processed to remove all recyclable materials. The waste management activities can provide employment opportunities to the local community while extending the service life span of the site. However, if not properly managed the dumpsite has the potential to cause a number of issues such as public health risks and environmental hazards.

Erongo Regional Council as a sub-national government commits to deliver prompt quality and accessible services for the community upliftment through good governance for sustainable socio-economic development. The council is committed toward waste management within its jurisdiction through establishment and formalization of waste disposal sites. In pursuit of the ideal, Erongo Regional Council (ERC) wishes to formalize the existing solid waste disposal site at Okombahe settlement. In terms of the Pollution Control Management Procedures, outlined in the Namibia's Pollution Control and Waste Management Policy, 2003, a waste disposal site must be registered and regulated with the relevant Competent Authority. Furthermore, the Environmental Management Act (EMA), Act No.07 of 2007 requires that; all activities of Waste Management, Treatment, Handling and Disposal may not be carried out without an Environmental Clearance Certificate being obtained.

The ERC appointed Green Gain Environmental Consultants cc to prepare an Environmental Management Plan (EMP) and apply for the Environmental Clearance Certificate (ECC) for the existing disposal site at Okombahe.

1.2 Objectives of the EMP

The EMP has the following objectives:

- To provide information on the potential negative impacts associated with the project and present mitigations measures for these impacts.
- To provide guidelines for the management and monitoring of the identified environmental issues.
- To provide guidelines to the responsible persons to follow appropriate contingency plans in the case of various possible impacts.

2. DESCRIPTION OF THE AFFECETD ENVIRONMENT

2.1 Socio-economic of the area

2.1.1 Location, History and Demographic of Okombahe

Okombahe is a settlement in Daures constituency of the Erongo Region on the eastern central of Namibia. It is situated about 70 kilometers north of Karibib on the bank of Omaruru River. It is regarded as the capital of the ǂNûkhoen (Damara) tribe and the annual King's Festival is held at the town's Gaob Memorial Stadium.

The population size of Okombahe is estimated at about 2,500 (ERC, 2018). However the settlement also serves other rural residential clusters and farms in the areas of Omatjete, Tubusis and Okongue.

2.1.2 Administration

Okombahe is managed by the Erongo Regional Council. It is administered by a personnel structure consisting of 11 staff members, which is headed by a Control Administration Officer (CAO) who is reporting to the Director of Administration seated at the Regional Council Head office. The full personnel structure for the settlement is presented below:

Figure 1: Settlement Personnel Structure

2.1.3 Land use

Okombahe is a rural settlement with agriculture, mainly small stock farming and gardening as the most important farming activities. The settlement was proclaimed as a town, which resulted in the establishment of Okombahe Proper (Figure 2). Municipal services such as water & sewer reticulations, electricity supply and refuse removal are currently provided to the formal residential area comprising of 400 houses and few institutions i.e. clinic and few public offices. The formalization of Okombahe extension 1 is expected to follow soon.

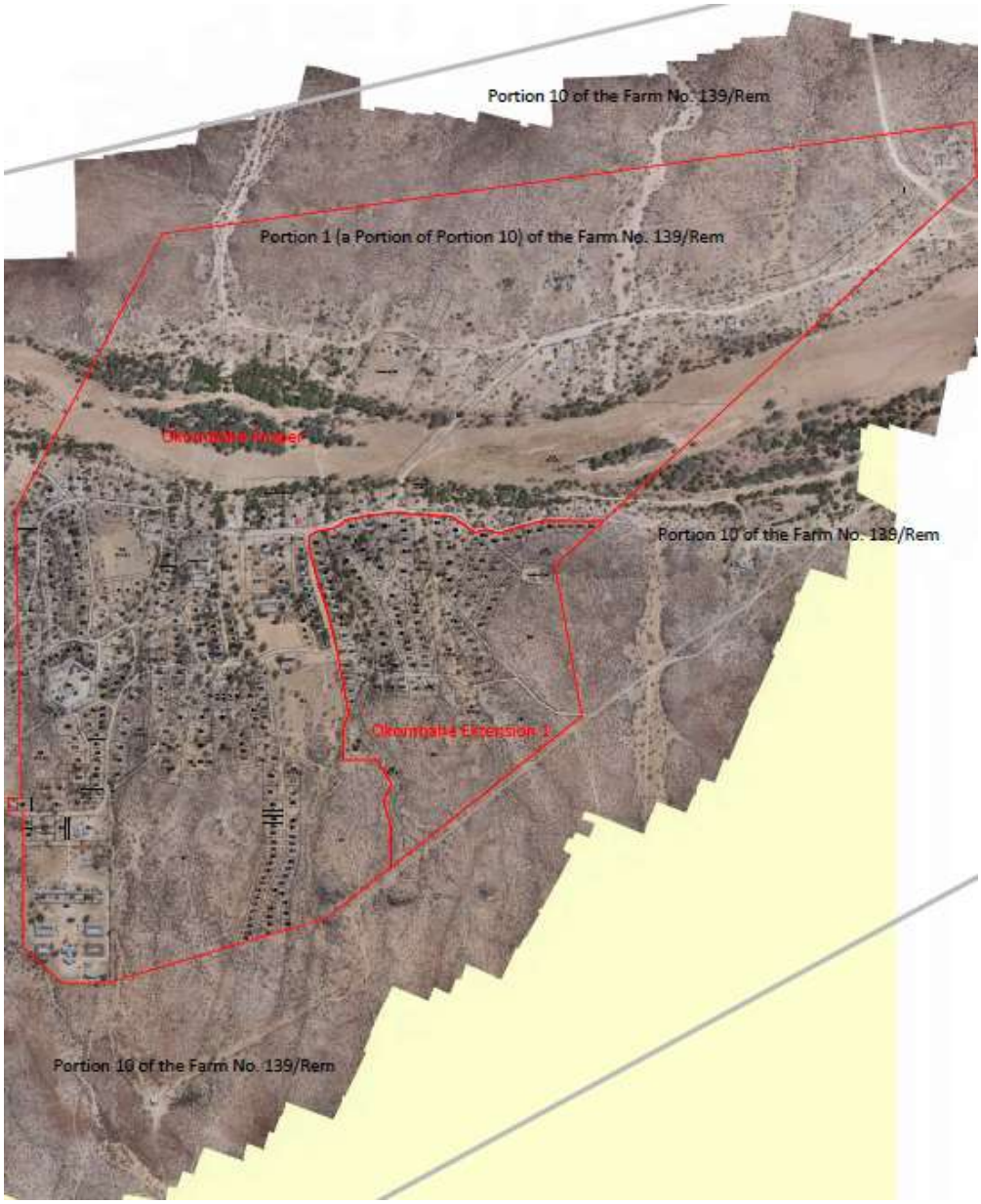

Figure 2: Okombahe Town and Townlands

2.1.4 Economic and Social development

The settlement is aided with few public institutions such as constituency office, a clinic, police (NamPol), MAWF, MWT, and Settlement office. The area is served with a gravel road network in its formal township and also connected to other parts of the region through a road network (gravel roads) such as Omatjete, Uis, Usakos. Water supply is mainly from the boreholes while electricity is provided from the national grid through the Erongo Regional Electricity Distributor Company (Erongo Red).

The district economy in the Okombahe Settlement Area is based on stock farming, which is the basis of livelihood.

Figure 3: Socio-economic situation in Okombahe

2.2 Description of the surrounding biophysical environment

2.2.1 Climate

In general, the climate of Erongo is classified as aridity with prominent features of very low rainfall ranging between 250 – 300 mm in the north – eastern parts and less than 15 mm at the coast. The periodic rainfall onset from January and ends in April. Furthermore, the temperature of the study area ranges from 6-8 degree minimum and 32-34 degree Celsius.

2.2.2 Topography ad Drainage

The topography of Okombahe is described by a combination of different landscapes such as mountain savannah, highland savannah, open grassland and river valley of the Omaruru ephemeral River.

Figure 4: Topographic features of Okombahe

2.3.3 Geology and soil

The regional geology of Erongo region is comprised mainly of the Swakop and Nosib Groups of the Damara Sequence. Soils in the region are mainly petric and gypsisols which are typical for the very dry areas of the central Namib. These soils have a moderately rapid to rapid infiltration rate and a high internal drainage. However, gypsisols are known to form compact layers or crusts just below the surface promoting surface water runoff. The main rock types prevailing in Okombahe is in the central zone of the Damara Orogenic Belt.

2.3.4 Vegetation

The vegetation of Okombahe is described chiefly by a mixture of thick, dwarf forests and mountain savannah. The locally occurring species include; common grass species dotted with trees and shrubs of common species such as boscia foetida, variety of acacia species, barleria damarensis.

Figure 5: Typical vegetation type of Okombahe

2.3.4 Groundwater potential

In terms of groundwater management, Okombahe is located in the Omaruru River Basin. The Omaruru River is about 13 100km2 and lies about 2080m above the sea level. The Omaruru River supports a diverse blend of agricultural activities, urban and rural settlements, vegetation and wildlife, about 98% of the catchment is defined as agricultural and 2% as recreational. Groundwater recharge is normally from rainfall and runoff seeping into the aquifer.

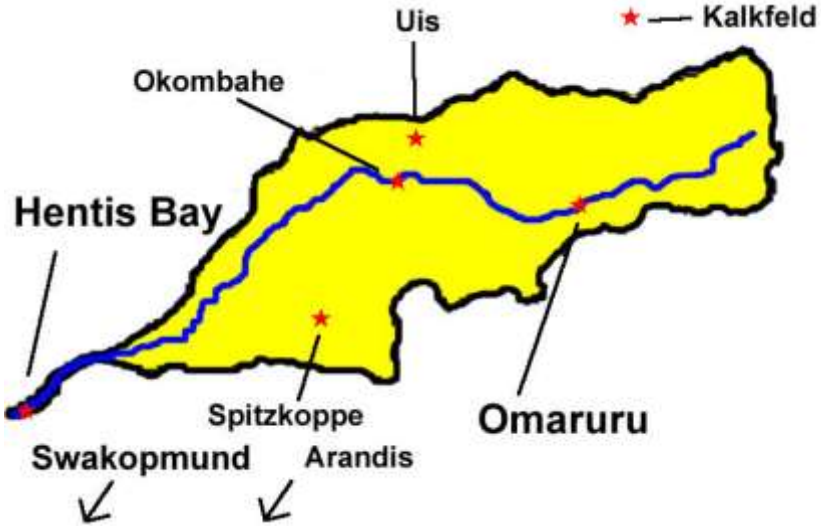

Figure 6: Omaruru River Basin

2.3 Solid waste Management: Current practices in Okombahe

2.3.1 Waste generation, collection and transportation

Solid Waste management services i.e. collection, transportation and disposal in Okombahe is provided by the Settlement office for the formal residential areas. Currently the settlement make use of communal skips and oil drum bins for waste collection purpose. Plans are underway to increase the number of communal skips and provide 200 wheelie bins for formal residents. The main types of waste produced in the area are; General Household waste (food waste, scraps, garden refuse & building ruble) originating from houses, institutions & streets, and Commercial waste (tins, bottles, cans, plastic, boxes etc), originating from businesses. The only source of hazardous waste is the healthcare waste from the clinic. These are normally collected and transported to the District hospital (Outjo) for incineration.

Collection of municipal waste from households and institutions is done by the Settlement office using a curbside methods, whereas waste from business and other activities is collected and disposed by the producers. The office has limited collection capacity in terms of manpower and vehicles and equipment. The following tariffs applies for refuse removal services.

Table 1: Tariffs for solid waste removal in Okombahe

Tariff description	Tariff (N$)
Refuse removal (Business)	60.48
Refuse Removal (Individual)	50.11
Illegal dumping	
1st offence	170.00
2nd offence	350.00
3rd offence	375.00
4th offence	Legal action

2.3.2 Waste Disposal: existing dumpsite

The settlement is served with a solid waste disposal site, located about 2km west of town. It can be found on following GPS coordinate (21.36' 1.11"S, 15.36'7.50"E).

Figure 7: location of the existing dumpsite

The site is an open dump, where all general municipal waste such as *household, garden refuse, building rubbles, etc.* are dumped without any sorting or segragation. The site is properly fenced with a barbed mesh wire (about 1.2m high) and have a lockable gate. Currently there is no proper access control of people and vehicles entering the site.

Figure 8: Existing dumpsite

Table 2: Attributes of the existing dumpsite

Attributes	Description
Area of the dumpsite (Ha)	2ha
Age of dumpsite (years)	New (2years)
Type of waste on site	Household, building rubble, garden refuse
Hazardous quantity in waste (%)	Less than 2%
Type of underlying geology	Swakop and Nosib Groups
Type of soil on site	petric gypsisols
Site topography	Flat (100m-1500.a.s.l)
Annual rainfall of the area	Sporadic (mm)
Water table depth and potential	Limited potential
Type of the underlying Aquifer	Damara Orogenic Belt
Distance from nearest underground water supply sources	More than 5km
Distance to critical habitats (such wetlands and reserved forest)	+/- 3km
Distance to the nearest residential houses/ properties	+/-2.5km (current)
Public acceptance	Currently no complaints

2.4 Concerns and Challenges toward solid waste management in Okombahe

The settlement has a limited capacity in terms of human resources as well as vehicle and equipment to ensure effective and efficient solid waste management in the town.

There is a need for additional staff to be responsible for solid waste management. The settlement also needs to be equipped with waste collection vehicles and machinery to ensure a standardized waste collection, transportation and disposal system.

- **Lack of control**

There is currently no proper control in terms of access and waste disposal. As result, refuse is found scattered. There is also no proper control measures against fire which pose serious risks of fire outbreaks to the area and surrounding. Due to the lack or limited control, the site is susceptible to vandalism, theft and other irrational activities.

- **Limited recycling initiatives**

Due to poor waste segregation and/or sorting, there is currently limited recycling initiatives in the area. The Settlement office needs to create awareness and disseminate information on recycling options and establish a reliable market for recyclables in order to reduce the waste streams at the disposal site which in turn will extend the service life spans of the site.

- **Disposal method**

The disposal method of open burning currently practiced by the settlement to disposed waste is considered unfit and not in accordance with National and International legislations. The settlement office needs to employ a new technique of waste disposal which is environmentally friendly, such as sanitary landfill.

2.5 Future plan and proposal

This EMP was prepared for the operation of the existing dumpsite in order to reduce or lessen environmental impacts associated with the dumpsite as well as to comply with the Environmental Management Act (EMA, No. 07 of 2007), hence an Environmental Clearance Certificate will be obtained for this site. The Regional Council has also proposed to adopt a new waste disposal technique such as landfilling in order to reduce environmental risks.

3. RESPONSIBILITIES

It is the core responsibility of the Erongo Regional Council to ensure the successful implementation of this EMP and any condition to be imposed by the Ministry of Environment and Tourism (MET). However, the implementation of this EMP also requires the involvement of various role players, each with specific responsibilities to ensure that the project is operated in an environmentally sensible manner.

3.1 Waste generator (Institution, households, organization, etc.)

Waste generator refers to any person or organisation whose activities produce any waste and, if that person/organisation is not known the person who is in possession and/or control of that waste. It is the duty of anyone who imports, produces, carries, keeps, treats, disposes of, or are a dealer or broker that has control of, controlled waste. Any person handling waste should make sure they handle it in a way that will bring no harm to the health of any individual or the environment. All waste producers make sure their waste collection bins are placed outside during the collection day or have their waste disposed of at the registered disposal site. Failure to comply with the above, shall be liable to penalties or face legal actions.

3.2 The Developer: Okombahe Settlement Office

Responsibilities

a). Implement the final EMP after approval by DEA and ensure the project comply with the EMP and conditions therein.
b). Notify MET and EAP (through the Regional Office) of any proposed changes to the Solid Waste disposal site and its surrounding.
d). Appoint the responsible official/s to take the responsibility of the following;

- Daily inspections and regular monitoring and review of the on-site environmental management and implementation of the EMP by the maintenance team or Contractor.
- Overall maintenance and control of the site (i.e. fences, gates, etc.)
- Control the disposal and burning of waste, collection of windblown litters
- Keep environmental records, Compile and submit Quarterly Reports to the Authority in accordance with Appendix A.

e). The above responsibilities could be shared among different officials as per their respective job descriptions. However the overall responsibilities should lie with the Chief Control Administrator.

f). In the absence of this appointment, the proponent (Erongo Regional Council) shall collectively take responsibility.

3.3 Regional office

The Regional office must play a pivotal and supervisory role toward the implementation of this EMP by ensuring the followings;

- Providing resources (financial, human, machinery and equipment) to the settlement office to carryout various solid waste management activities
- Provide Environmental training and awareness on the EMP to all contractors, sub-contractors and employees involved in the management of the Solid Waste disposal site. Environmental awareness training takes place in the language of the employees.
- Audit the implementation of the EMP on a monthly basis
- Ensure the review/update of this EMP as required and renewal of the ECC

3.4 Line Ministries (MoHSS, MET, MAWF etc.)

Different Government Ministries should provide supervisory and monitoring roles in order to ensure compliance of their respective regulations and laws by renewal or enforcement of respective laws. Of relevance to this project are; the Ministry of Health and Social Services, Ministry of Environment and Tourism, Ministry of Works and Transport and Ministry of agriculture, Water and Forestry.

- **Ministry of Health and Social Services** should provide monitoring on the general public health and safety issues in town in consultation with the Settlement Office. Moreover, The MoHSS is responsible for collection and disposal of medical waste or healthcare waste from the clinic in accordance with National Healthcare Waste Management Plan, as well as inspection of food outlets in and around town and nearby villages.
- **Ministry of Environment and Tourism** should conduct an Environmental compliance monitoring should any instances of non-compliance be found, this must be brought to the attention of the site foreman, along with recommended measures for rectifying the non-compliance.
- **Ministry of Agriculture, Water and Forestry–(Veterinary Services)** is responsible for control of animal healthcare (veterinary) waste i.e. expired drugs, needles, carcasses. These types of waste maybe incinerated and the ashes must be disposed in the acceptable manner and in consultation with the Settlement office.

4. LEGAL FRAMEWORK

There exist a number of international, national legislations which provide a broad range of principles related to pollution control and waste management. Some of these legislations are as follow;

Table 3: Applicable legislations

LEGISLATION	PROVISION AND REQUIREMENTS
1. Legislation of national importance	
Pollution Control and Waste Management Policy, 2003	This policy serves to regulate and prevent the discharge of pollutants to air and water as well as providing for general waste management procedure. **The bill provide framework for a multitude administration on pollution control and waste management in the country. Each authority identified by the bill shall play its respective roles.**
Environmental Management Act, No.07 of 2007	Ensuring that the significant effects of activities on the environment are considered carefully and in time. To promote the sustainable management of the environment and the use of natural resources by establishing principles for decision making on matters affecting the environment. **An ECC is required for this project and any changes to the current project should be subjected to an EIA and thus amendments to the EMP should be made. In this case of decommissioning, it should be done in accordance with the EMA and thus an EIA for the new dumpsite shall be undertaken. The ECC for this project should also be renewed every after three years.**
Public Health and Environmental Act, 2015	The objectives of the PHE Act are to; • Promote public health and wellbeing • Prevent injuries, diseases and disabilities • Protect individuals and communities from public health risks • Encourage community participation in order to create a healthy environment • Provide for early detection of diseases and public health risks **Section 2 requires that a). "Every local authority must take necessary reasonably and applicably measures to maintain its local authority area at all times in a hygienic and clean condition" b). Prevent occurrence of a health nuisance, unhygienic condition, an offensive condition or any condition which could be harmful or dangerous to the health of a person within its local authority or the local authority area of another local authority"**
Atmospheric Pollution Prevention Ordinance, no. 11 of 1976	To provide for the prevention of the pollution of the atmosphere, and for matters incidental thereto. The Ordinance deals with administrative appointments and their functions; the control of noxious or offensive gases; atmospheric pollution by smoke, dust control, motor vehicle emissions; and general provisions.

	According to the Ordinance, the Local Authority shall control and prevent atmospheric air pollution or emission of noxious or offensive gases by smoke.
Hazardous Substances Ordinance 14 of 1974	This Ordinance provides for the control of toxic substance and thus also relevant for pollution control. It covers for the manufacturing, sale, use, disposal, dumping, importing and exporting of hazardous waste. **The Regional Council shall control the manufacturing, used or disposal of hazardous waste as per this Ordinance**
The Soil Conservation Act No.76 of 1969	This Act is provides for the prevention and combating soil erosion, the conservation, improvement and manner of use of the soil and vegetation and the protection of water sources,
Medicine and Related Substances Control Act 13 of 2003	Enforces disposal of undesirable medicines
Atomic Energy and Radiation Protection Act, 5 of 2005	License required for the disposal of radiation source or nuclear material Amended under hazardous substances ordinance Radioactive waste is presently transported across the borders as there is no disposal facility in Namibia.
Namibia Integrated Health Care Waste Management Plan, 2010	Provide the information to allow health care facilities to establish a good healthcare waste management system consistent with the regulatory requirements of Namibia.
National Solid Waste Management Strategy 2018	Provides coordination for funding, regulations, action plan for proper solid waste management and facilitate stakeholder collaboration.
Waste Disposal Site Siting Guidelines, 2017	Provide guidelines and specifications for Sanitary Landfills and Criteria for Site Selection.
2. Relevant Legislations of international importance (Conventions)	
Basel and Rotterdam Convention, Framework Convention on Climate Change	Agreed to ensure environmentally sound management of hazardous waste and other wastes through the reduction of their movements, for the purpose of reducing their impacts on human health and environment.
Stockholm Convention on Persistent Organic Pollutants	Agreed on a list of Hazardous Chemicals that require an EA/EMP, waste minimization (reduction), reclamation and recycling strategy
3. Other related Legislations	
Labour Act (No 11 of 2007)	To establish a comprehensive labour law for all employers and employees; to entrench fundamental labour rights and protections. Regulate basic terms and conditions of employment; ensure the health, safety and welfare of employees; to protect employees from unfair labour practices; to regulate the registration of trade unions and employers' organisations; to regulate collective labour relations; to provide or the systematic prevention and resolution of labour disputes;

5. INTEGRATED SOLID WASTE MANAGEMENT STRATEGIES

This section provide a description of integrated solid waste management strategies that promote effective waste management systems and sage waste disposal practices. The ISWMS will allow the Settlement/Regional Council to plan careful and make provision in terms of facilities, personnel to manage all types of waste from generation to disposal. The ISWMP should serve as a regulatory framework to enforce, promote and support the principles of waste management from collection, transportation, disposal, storage of various kinds of municipal solid waste.

The ISWMP will include a number of strategies such as; waste management education and awareness, inventory management, waste hierarchy and minimisation initiatives i.e. recycling and resource recovery, collection, transportation and pre-treatment strategies and general maintenance of the disposal site as explained in detail below;

5.1 Waste Management Education

Awareness raising campaigns are a key component to ensure effective solid waste management, disseminate information and educate community and raise awareness on what materials should be recycled and how they should be presented (i.e. loose and plastic-bag free apart from the flexible plastic program). These education programme includes;

- **Educational postcards and General guide:** to waste services, to provide information about collection days, what materials can be placed in each bin and correct placement of bins on the kerbside. These materials can be produced and distributed at the public offices i.e. churches, clinic, police, settlement office etc.

- **Community clean up campaigns-**:The Settlement in consultation with other Public entities should organise regular clean up campaigns in order to cultivate a culture of cleanness in the town.

- **Others:** Existing community gatherings should also be used to raise awareness on waste management in the town.

5.2 Waste Inventory Management

It is difficult to achieve effective solid waste management without a good data base. It is recommended that the Settlement Office develop an integrated register of all types and quantity of waste generated in the town as well as where and how they are used and how the residues or out-dated materials are stored or disposed. Furthermore, there should be an up to date filing system for the project whereby method statements, environmental incidents report, training records, audit reports and public complaints register are kept.

5.3 Waste Management Hierarchy

If not properly planned, the collection, handling/storage and transportation waste can be a very costly exercise. The waste hierarchy remains the cornerstone of most waste minimization strategies. The aim of the waste hierarchy is to extract the maximum practical benefits from products and to generate the minimum amount of waste. These save costs and land as well as conserve natural resources, landfill space and energy. The hierarchy classify waste management strategies according to their desirability in terms of waste minimization. According the hierarchy; waste avoidance at source is to be considered as highly preferable, followed by the 4Rs namely; Reduce, Re-use, Recycle and Recovery whereas; Treatment, Containing and Disposal should only be considered as last resorts. The waste hierarchy is explained in detail below;

Figure 9: Waste management hierarchy

5.3.1 Waste avoidance and reduction

The process of waste avoidance and reduction is a primary focus for most waste management strategies. It begins with an examination of what you are using? i.e. paper, plastic etc. and what it is used for?, which involve reducing the amount of waste produced in society and helps to eliminate the generation of harmful and persistent wastes, supporting the efforts to promote a more sustainable society. A key action in minimising waste is influencing community behaviour regarding waste production. This can be done in different ways;

- Adopting a green procurement approach by buying environmentally preferred products
- Establish a green team for the town/Region that promotes and actively seeks opportunities to reduce waste and increase recycling in day-to-day operations (e.g. re-using old recycling crates and used tyres as planter boxes for plants and fruit trees)
- Participating in local programs, festivals and working with local business groups on waste minimisation initiatives e.g. Local retail programs for alternatives to disposable plastic bags, food waste recovery etc.

5.3.2 Re-use and Recycle

Recoverable materials that are organic in nature, such as **plant material, food scraps, and paper products**, can be recovered through composting and digestion processes to decompose the organic matter. This should start with identifying a designated site or cell within the dumpsite for decomposing organic waste separately from other wastes. The resulting organic material can be recycled as mulch or compost for agricultural or landscaping purposes. Other types of waste such as; **plastic, boxes, cartons, tins, bottles, cans etc.** which originating from business premises as well **as papers, newspaper, boxes, electronics** originating from Institutions/offices are recyclables. The Settlement office with support of the Regional Council and in collaboration with institutions and residents can establish recycling project/s. The ideal site for this centre is at the town's CBD and location (next to sheebens). See Appendix B, a framework for establishing a recycling project. Some of the local recycling companies are as follow;

Table 4; Potential Recycling companies

Company name	Town and Address	Types of waste recycle
Rent-A-Drum Pty Ltd.	Swakopmund	General domestic waste (cans, papers, plastic,
Mpact Corrugated (Pty) Ltd	44 3rd street East, Walvis Bay Tel: + 264 64 214 200 Fax: + 264 64 200 667	Paper, boxes, cardboard,
WESCO	Walvis Bay	Oil, grease
Envirofill Pty Ltd	Swakopmund	General domestic waste (cans, papers, plastic,
Transworld e-waste	Windhoek	electrical and electronic equipment
Scrap Salvage Pty Ltd.	**cassie@scrapsalvagenam.com** Swakopmund	Wrecks, scrap metals
Ge-co Glass	P. O. Box 86243, Eros Windhoek 0813275372	Glass

For more information and contact details, visit, Namibia Recycling Forum (www.rfn.org.na)

5.4 Improve waste collection and transportation systems

The waste collection and transportation systems should be standardized and improved to ensure effective solid waste management while minimizing the cost involved. Standards would involve the following;

- Team or staff members responsible for solid waste should receive training on effective solid waste management
- Standard refuse bins (Wheelie bins) and Skips as collection point
- Develop a Waste collection Schedule and work accordingly
- Develop a Service Plan for all vehicles and equipment used in waste collection
- Procure a vehicle for waste collection and transportation
- All vehicle used for transportation of waste must have a canopy cover to contain windblown waste (i.e. net, tonner cover etc.)
- Encourage street sweeping and litter picking on a regular basis. This can be done through a volunteer (on incentive base) or by the officials on regular basis

5.5 Control littering and illegal dumping

Litter found in streets and public open spaces often includes; cigarette butts, beverage containers, paper, plastic film and wrappers. These can be reduced by installing pole bins on street lights which can be emptied on regular basis by the waste collection team. Illegal dumping remains a significant challenge in most town in Namibia. This often include dumping of building ruble, garden waste and some household waste i.e. scraps, redundant items, batteries etc.

Controlling illegal dumping has proven difficult, hence there seems to be misconceptions among the urban residents that they are only responsible for keeping their home clean, but their immediate environment and public places, like streets and drains, are the responsibility of the municipality. Such behavior is regarded as a major barrier to the successful implementation of SWM in urban areas. This require concerted efforts and educational programmes to sensitize people toward attitude changes in order decrease the incidence of illegal dumping. This approach would graduate to enforcement actions and imposing of fines in accordance with Council approved tariffs.

5.6 Improve Waste disposal and treatment

The waste disposal site must be properly arranged in order to achieve the following;

- Prevent risks to human health and environment.
- Reduce littering
- Vector Control i.e. flies, rodents, stray animals etc.
- Control dust, noise, odor
- Reduce cost of disposal,
- Extend service life span of the disposal

There are several types of waste management techniques. Some of the environmentally friendly waste management techniques are; sanitary landfill and controlled dumping. Sanitary landfill is an acceptable waste management method, with controlled emissions and limited health and environmental impacts. There are two types of sanitary landfill namely; Area method and Trenching method.

Area Landfill

The solid waste is placed on the land without any excavation. A bull-dozer or similar equipment spreads and compacts the waste; then the waste is covered with a layer of earth; and finally the earth cover is compacted. The area method is best suited for flat areas or gently sloping land, and is also used in quarries, ravines, pits, or where other suitable land depressions exist. Normally the earth cover material is hauled in or obtained from adjacent areas.

Trench Landfill

A trench is cut in the ground and the solid waste placed in it. The waste collection truck deposits its load into the trench. The waste is then spread in thin layers, compacted, and covered with earth excavated from the trench. At the end of the day the dragline excavates soil from the future trench; this soil is used as the daily cover material. Trenches can also be excavated with a front-end loader, bulldozer, or scraper. This method can be very expensive and time consuming thus only suitable for large cities.

Recommended waste disposal methods: Sanitary landfilling (area method)

Given the fact that Okombahe is yet a small town with small quantity of waste produced, an area method is highly recommended. Below is a systematic example of the sanitary landfilling by area method.

Step 1: Preparations

The site should be dived into different cells/sections, depending on the type and nature of waste. Construct a recycling stall where all recyclables can be dropped and sorted. The purpose of a landfill is to bury the trash in such a way that it will be isolated from groundwater, will be kept dry and will not be in contact with air. Under these conditions, trash will not decompose much

The recycling stall should have different section of each types of waste to be recycled. The stall must be made in such a way that wind-blown waste are contained and do not escape with wind. Recyclables can be sorted, compacted and contained into bags before transported to the nearest recycling center. Make arrangement with different recycling companies for transportations. The recycling stall can be operated in collaboration with volunteers or private companies or contractors. Only after the recyclable materials have been removed that, unwanted waste should be buried.

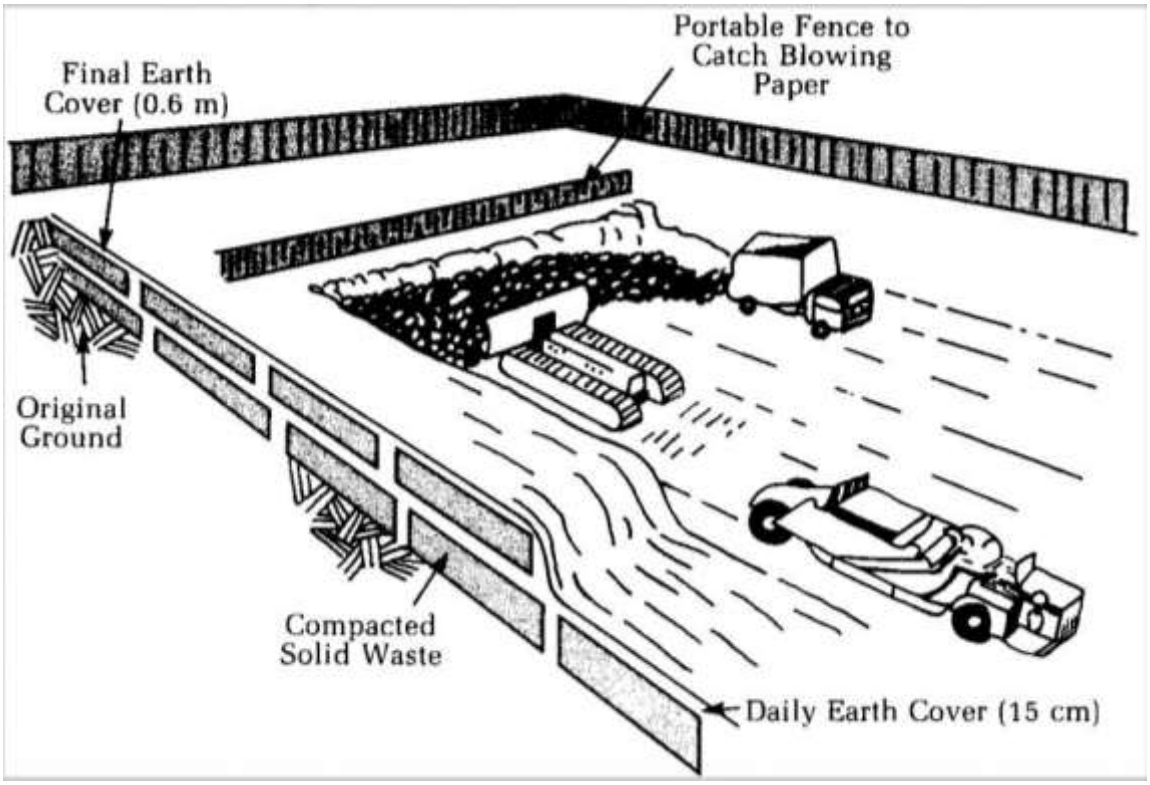

Figure 10: Sanitary landfill-area method

Step 2 Compaction and Composting

All garden waste must be disposed at a separate section/cell. These waste can either be buried or made into a heap. It is expected that general garden waste i.e. tree branches, leaves, grass clips etc. can decompose over time. Prepare a cell for disposal of other types of waste which does not have recycling value waste on daily or weekly basis. Waste stream can be compacted which heavy implements to reduce the size of the heap. Building rubble can be used as fill to burry other types of waste i.e. organic waste. All expired food and hazardous waste (if any) must be discarded as soon as possible in the presence of an authorized official/s.

5.7 General Operation and Maintenance of the dumpsite

The following issues needs to be addressed to ensure proper control and management of the dumpsite in order to reduce negative impacts and optimize the benefits.

- Gates and Access control

The dumpsite is already fenced off and served with a lockable gate. In order to ensure maximum control, a temporary guardhouse at the entrance should be established to facilitate access control of vehicles and people. There must be at least a guard on daily basis to control access and provide direction to vehicles to the appropriate disposal units. The gate guard should also inspect the loads inside certain vehicles if deemed necessary.

- Signage, Rules and Restrictions

Information notice board which displays information to the users regarding the various operations and hours, details of operators, contact numbers, etc. should be placed at the entrance of the site. **Only general municipal waste such as; *household, garden refuse, building rubble, some industrial i.e. tires, scraps, wrecks must be allowed.* Infectious waste and Hazardous i.e. used oil, asbestos, healthcare etc. must NOT be allowed at the dumpsite.** Open burning, scavenging, smoking and hazardous activities should be prohibited on-site.

- Monitoring and Environmental Reports

The Control Administrative Officer as the senior person at the settlement should be responsible for conducting regular monitoring in respect of the general operation of the dumpsite. The monitoring should be done for certain environmental elements and frequency specified in **Table 6**, using a monitoring Checklist (**Table 7**). This monitoring report should then be compiled into quarterly reports as per given format (Appendix A), which is to be submitted to the competent Authority (MET) throughout the operation life span of the site. This requirement is in accordance with the National Solid Waste Management Strategy, 2018.

6. PROPOSED MITIGATION MEASURES DURING OPERATION PHASE

In addition to the Integrated Solid Waste Management Plan described above, the following mitigation measures must be enforced to prevent, avoid and lessened negative environmental and public health risks that are associated with the operation of the dumpsite

Table 5: Proposed mitigation measures during the operation phase

RISK	OBJECTIVE	RECOMMENDED MITIGATION MEASURES	RESPONSIBILITY
1. General Waste Management			
1.1 littering: wind-blown waste can easily pollute the surrounding area.	Reduce pollution	• All wind-blown litters must be covered with other heavy waste i.e. building rubble to prevent it from being blown away. • Maintain the fence to contain windblown litters • Encourage recycling of papers, plastics to reduce amount going to the dumpsite • Assign a team to collect all wind-blown waste around the dumpsite on regular basis • Organise Clean-up campaigns to encourage residents to take part	Control Administrative Officer
1.2 Danger of expired food -Expired food in the dumpsite attracts residents especially scavengers such as kids. This pose serious public health risks.	Ensure Public safety	• All expired food items must be condemned at the disposal site as soon as possible. This should be done in the presence of the Health Inspector. • No expired food must be condemned in the absence of the municipal official, if such official is not available on sit, any other authorized qualified municipal official must assist.	Control Administrative Officer
1.3 Unauthorized dumping i.e. dumping at unauthorized sites, dumping of hazardous waste etc. can lead to serious public health.	Proper use of the dumpsite	• Create public awareness through campaign, meetings, etc. • Install an Information Notice Board at the dumpsite entrance depicting all rules and regulations to the users. • Enforce penalties for illegal dumping and non-compliance.	Control Administrative Officer
1.4 Risks of fire from burning of waste which could spread to nearby residents or vegetation.	Ensure public safety	• Do not leave fire unattended • Avoid burning when its windy • Waste should be burned in the whole/excavation • Provide fire cuts around the dumpsite (Contact MAWF-Forestry for more information)	Control Administrative Officer

1.4 Dust and fumes from vehicle and plants may generate noise, dust, vibration which mighty be a nuisance to the nearby residents	Avoid nuisance	• Avoid operating when its windy • Provide dust suppression when it's necessary	Control Administrative Officer
2. Public Health and Safety Risks			
2.1 Smoke: burning of waste could generate smoke which is dangerous to human. -The smoke from the dumpsite is associated with a number of public health risk such as; a). Respiratory abnormalities b) Abdominal problems c) Ear infection d) Central nervous system e) Blood disorder -These can occur as a result of inhalation of smoke, ingestion of contaminated items or absorption through skin cells. -Smoke can also cause health problems to animals and other living organisms in the area -Smoke in the surrounding may obstruct traffic flow within the surrounding area. **2.2 Smell/odours;** -Biodegradable organic material emit obnoxious odors that cause illness to people living in, or around, them.	Ensure Public safety	• Avoid open dumping of waste • No burning of waste should be done on windy days • Only burn a certain amount of waste at a time • All employees must be provided with PPE • No development should be allowed with 500m from the dumpsite • Large volume of organic waste should be buried or covered with sand • Dead animals must be burned or buried • Apply chemicals to avoid infestation of flies and rodents (when required)	Control Administrative Officer

Since they ferment, they could create favorable conditions for survival and growth of microbial pathogen. **2.3 Diseases transmission** Unattended wastes lying around attract flies, rats, and other animals that in return spread diseases.	Avoid transmission of diseases associated with solid waste management	• As above	Control Administrative Officer.
-Dumpsites closer to residential areas are always feeding places for dogs and cats. These pets, together with rodents, carry diseases to nearby homesteads.		• Ensure proper maintenance of fence • All organic waste that could attract pets must be discarded	Control Administrative Officer.
2.3 Contamination and infections -The dumpsite area may become children's sources of contamination due to the incubation and proliferation of flies, mosquitoes, and rodents.		• No unauthorized scavengers • Ensure access control	Control Administrative Officer.
-Due to poor waste segregation, some medical waste maybe found mixed up with domestic waste and end up at the dumpsite. This pose a serious risk of infection with Hepatitis B, HIV, and other related diseases.		• Ensure waste proper segregation at hospitals • Training of Waste collection team especially those collecting waste from health centres • Hospital and other health centres employees must also be well informed about segregation of waste domestic and medical waste.	EHP/Nurse at OkombaheClinic

-Colored plastics are harmful as their pigment contains heavy metals that are highly toxic. **2.4 Occupational Health risks** -Direct handling of solid waste can result in various types of infectious and chronic diseases with the waste workers and rag pickers being the most vulnerable. These include: skin or blood, eye and respiratory and intestinal infections as well as cancer resulting from exposure to dust or hazardous compounds. -Direct exposure to municipal waste can lead to diseases through chemical exposure as the release of chemical waste into the environment leads to chemical poisoning and radioactive hazard. Many studies have established that there is a strong connection between exposure to waste and diseases. -Employees/workers can also be at risk of injuries from sharp objects at the dumpsite if they are not properly protected. -Employees are also at risk of accidents during waste handling, i.e. muscle disorders from lifting heavy containers, infectious wounds from contact with sharp objects or poisoning and chemical burns from chemical waste mixed with general waste.	Ensure safe working environment	• All coloured plastics must be burned • Discourage use and/or recycle of plastic in town through campaigns and awareness • All employees must receive training in line with their respective duties • Employees must be provided with Personal Protective Clothing/Equipment.	

3. Soil contamination			
3.1 Contamination of soil with heavy metals from tins, cans etc.	Prevent soil contamination	• Encourage recycling of tins, cans • Avoid burying waste that contains lead i.e. tins, cans scrap metals (These can be sent to scrap yards for recycling).	Control Administrative Officer
3.2 Oil leakage from vehicle, machinery could contaminate the soil	Prevent soil contamination	• Clean up the contaminated soil • Ensure proper and frequent servicing of vehicle and equipment used at the site	Control Administrative Officer
3.3 Soil erosion from disturbed areas during waste disposal	Soil conservation	• No excavation should be done, hence an area landfill method is recommended (See page 27-28 for more information). • Do not extract soil from slope areas • Provide erosion barrier to prevent soil form carrying away	Control Administrative Officer
4. Groundwater and Freshwater contamination			
4.1 Unlined dumping hole may pose serious risks of groundwater contamination by leachate.	Prevent groundwater contamination	• No hazardous waste allowed • Waste containing heavy metals may not be buried, unless a linear system is provided • No burying of waste next to storm water course	Control Administrative Officer
4.2 Contamination of nearby watercourse	Prevent contamination of freshwater	• Avoid major drainage lines when burying or disposing waste • Storm water that is mixed with waste (leachate) must be contained or redirected/disposed at wastewater treatment plant.	Control Administrative Officer
5. Operational Management and Maintenance			
5.1 Inadequate management if site operator is ill / on leave or resigns	Ensure effective and efficient management of the plant	• At least two site operators must be fully trained in the operation of the site, so that one can stand in for the other in case of illness, leave, etc.	Control Administrative Officer
5.2 Lack of skills on the part of the site operator	Ensure effective and efficient management of the site.	• The existing system requires only a moderate level of skill and technical expertise. • Drivers and site Operators must have appropriate skilled and experienced for the task at hand • Site operator/s must receive continuous training in all aspects of daily management of the site (technical or administrative) • Technical support must be available to the site operator	Control Administrative Officer
5.3 Lack of proper and timely maintenance of vehicles, plant, structures may compromise the functionality of the site	Ensure smooth operation	• The fence and other site structures must be maintained regularly by replacing key components, when required.	Control Administrative Officer

		• A maintenance plan must be in place to ensure that planning, such as budget allocation or procurement of service providers, can be put into motion sufficiently ahead of time.	
5.4 Document control and access to information	Readily available of records and information about the site	• Ensure that all reports are available and easily accessible	Control Administrative Officer
6. Legislation requirement			
6.1 Lack of compliance with relevant legislations may cause transgression or conflicts with the law	Operating within the requirements of the law	• This EMP must be reviewed every three years, concurrent with the renewal of the ECC • Any upgrading of the disposal site should be done in accordance with relevant legislations as outlined in this document.	Control Administrative Officer

7. ENVIRONMENTAL COMPLIENCE MONITORING

In order to ensure adherence to this EMP, it is advisable to keep monitoring of certain environmental elements. Compliance monitoring provides useful information for determining environmental performance for the duration of the project. This monitoring is ultimate responsibility of the proponent. Monitoring activities should be conducted by the qualified official at different interval/frequencies as indicated in the table below throughout the project life span. The monitoring report should be prepared and submitted to the Environmental Commissioner on quarterly basis.

7.1 Monitoring

Table 6: Monitoring Schedule

Issue to be monitored	What need to be monitored	Monitoring frequency	By Who?	Report to Who?
General cleanness of town	Presence of litters in and around town	Monthly	CAO	Director-ERC
Waste generation	Quantity of waste collected and disposed at disposal site.	Monthly	CAO	Director-ERC
Waste minimization	Quantity of recyclables collected	Monthly	CAO	Director-ERC
Cost of SWM	Cost involved in SWM activities	Quarterly	CAO	Director-ERC
General operation of the dumpsite	Condition of fences, gates of the dumpsite. Complains registered	Monthly	CAO	Director-ERC
Quarterly Report	Key activities/actions implemented as EMP	Quarterly	Director	MET-WMU

7.2 Site Environmental Monitoring Checklist

The following checklist should be used during the monitoring program. The checklist will enable the project to cope with new circumstances and/or requirements of community or the Authorities as they arise. The checklist should be filled in regularly as per monitoring schedule outlined in the table above. For example, the Regional Council shall prepare a detailed checklist outlining all environmental parameters which needs to be monitored as depicted in Table 4 above.

Table 7: Site Inspection Checklist (Example)

	KEPT AT STANDARD LEVEL?		
Issue to be monitored	***YES***	***NO***	***Comments***
i.e. Littering, Dust, Fire etc.			

This information is true and correct to the best of my knowledge

Name of person inspecting site: _____

Signature: _____

Date of site inspection: _____

8. CONCLUSION AND RECOMMENDATIONS

It is concluded that the existing solid waste disposal site at Okombahe is of the required standards as outlined in the National Solid Waste Management Strategy, 2018 and MET's Solid Waste Disposal sitting guidelines, 2017. The site can thus, be operated without posing any serious threats both to the public and environment provided that the proposed integrated solid waste management strategies and mitigation measures outlined in this document are fully implemented.

The Regional Council must play a pivotal role and provide organisational support to the Settlement Office toward the implementation of this EMP. Upon approval by the competent authority (MET), this EMP shall be considered legally bidding and any deviation or transgression from this EMP is punishable by law as per the Environmental Management Act, No. 07 of 2007.

The preparation of this EMP is based on the current information about the project, any upgrading or changes to the project or surrounding, shall trigger changes to this EMP. A copy of this EMP shall be kept by the Regional Council and the Okombahe Settlement Office at all time. Furthermore, the Regional Council should ensure effective compliance monitoring as outline in this EMP and compile quarterly reports to the Solid Waste Management Unit. The Authority after reviewing the annual report will determine whether the corrective actions are adequate or any new actions or any modifications are required.

To this end, the validity of this EMP is a period of three years after which it should be reviewed every three years concurrent with the renewal of the Environmental Clearance Certificate.

9. REFERENCE

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10. APPENDICES

Appendix 1: Format of the Quarterly Report

Appendix 2: Framework to establish a recycling plant

Appendix 3: List of Stakeholder Consulted

Appendix 4: EAP Curriculum Vitae

Appendix 1: Format of the Quarterly Report

Background				
Quarter covered by report (e.g. Q2 2019)	Quarter:	Year :		
Name of Local Authority:				
Main contact related to SWM:				
Phone number of main contain:	Phone No.	Email:		
Date report submitted:				
ISWMP				
ISWMP adopted by Council?				
ISWMP includes capital and operating costs?				
Estimated quantity of waste disposed (tones/month)	Month 1:	Month 2:	Month 3:	
Waste disposal				
Number of disposal sites used by local authority		Additional Information:		
Operators of disposal sites(s):	□ Local Authority	□ Private company	□ No operator	
Rehabilitated large area of site with cover material?	□ Yes	□ No		
Operator present at site during the day to direct trucks to point of waste tipping?	□ Yes	□ No	Additional Information:	
Disposal operation involves use of one small working area of exposed waste at site?	□ Yes	□ No	Additional Information:	
Cover material applied (use of bulldozer)?	□ Yes	□ No	Frequency	
Construction waste stored at separate area?	□ Yes	□ No		
Garden waste stored at separate area?	□ Yes	□ No		
Open burning of waste carries out?	□ No burning carried out.	□ Controlled burning only carried out at pre-set times.	□ Burning continues uncontrolled	Additional information/date of last burning:
Site fenced?	□ Yes	□ No	Additional Information:	
Security at site at night?	□ Yes	□ No	Additional Information:	
Typical number of waste pickers at site per day?	□ Yes	□ No	Additional Information:	
Consultation started with waste pickers?	□ Yes	□ No	Additional Information:	
Waste pickers organized (e.g. into groups with financial incentives)?	□ Yes	□ No	Additional Information:	
Internal fenced area for trenching selected hazardous waste (if approved by MET)?	Yes	No	Additional Information:	

Appendix 2: Framework for establishing a Recycling Plant

Pilot project:	Establishment of recycling centres in town
Rationale:	There is a lot recyclable materials produced in town especially from business premises. These items could be separated at sources and would not need to go to the disposal site. 
Main tasks:	• Identify potential sites for pilot projects • Identify potential members of the community who would become members of the Recycling Teams i.e. unemployed youth, churches support groups, etc. • Allocate sites different recycling groups • Identify recycling companies for example Rent a Drum • Develop and agree on plan including responsibilities
Investment:	• Main investment would be containers for separation for recyclable materials at the recycling centres • Each recycling group will be receiving an income per volume of collected recyclable materials collected that serve as an incentive to work on the project.

Responsibilities:	• OTC- Organisation of the separation of clean recyclable materials into containers at agreed places (e.g. central business areas).
	• Recycling company –
	  ○ potential investment in containers.
	  ○ Weighting of collected recyclables
	  ○ payment for collected recyclables
	  ○ collection and transportation of recyclable materials.
	• Recycling Teams:
	  ○ collection and separation of recyclable containers into containers.
	  ○ clean-up of litter from around working area.

Timescales:	Start Planning by October 2018 latest. Set up pilot project and start operation by February 2019
Key points:	This is an organisation / logistical pilot project with low costs except much time will be needed for co-ordination and monitoring.

Appendix 3: List of Stakeholders Consulted

ORGANISATION	CONACT PERSON	CONTACT DETAILS
Erongo Regional Council	Mr. Sam Petrus Snr Development Planner	spnyau@gmail.com 0812143349
	Ms. Reginalda Shonghela Development Planner	rshonghela@erongorc.gov.na
Okombahe Settlement office	Mr. Bessel Control Administrative Officer	+26481-6414420
Daures Constituency Office	Daures Constituency Councilor	
MAWF-Forestry	Ms. O. Nghinyangelwa Forestry Technician	081
Ministry of Health and Social Services –Okombahe Clinic	Sister in Charge/Senior Nurse	+264-64 570 864
Ministry of Health and Social Services –Omaruru District Hospital	Ms. N.Nyathi EHP	+26481-6694991 +264-64 572 904
Ministry of Health and Social Services –Erongo Region	Mr. Hage Siegfried Environmental Health Inspector	0818828119 mraukhaob@gmail.com