

**RUNDU WATER SUPPLY SCHEME**

**ENVIRONMENTAL MANAGEMENT PLAN**

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**Prepared by:**  
NamWater, Private Bag 13389, Windhoek, Namibia  
Contact Person: N.P du Plessis  
Tel: +264-6171 2093  
Email: Plessisn@namwater.com.na

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## LIST OF ABBREVIATIONS

<b>AIDS</b>	Acquired Immune Deficiency Syndrome
<b>CoC</b>	Code of Conduct
<b>DEA</b>	Directorate of Environmental Affairs
<b>EMA</b>	Environmental Management Act
<b>EMP</b>	Environmental Management Plan
<b>HIV</b>	Human Immunodeficiency Virus
<b>I&amp;AP</b>	Interested and Affected Parties
<b>MET</b>	Ministry of Environment and Tourism
<b>NEM</b>	NamWater Environmental Manager
<b>MSDS</b>	Material Safety Data Sheet
<b>NWQG</b>	Namibian Water Quality Guidelines
<b>NWQS</b>	Namibian Water Quality Standards
<b>STI's</b>	Sexually Transmitted Infections
<b>WTW</b>	Water Treatment Works

## **1. PURPOSE OF THE EMP**

This Environmental Management Plan (EMP) has been compiled and updated for the management of potential environmental impacts during the operation, and decommissioning phases of the existing Rundu Water Supply Scheme. Best practice is proposed for the generic issues of construction management and supervision as well as the on-going management and operation of the water supply scheme.

In terms of the Environmental Assessment Policy of 1994 and the Environmental Management (Act No 7 of 2007) (EMA), the activities required for the construction of the proposed project requires authorization from the Directorate of Environmental Affairs at the Ministry of Environmental and Tourism (MET: DEA).

An Environmental Clearance Certificate (ECC) was originally issued in 2017 and this EMP serves as an application for the renewal of the ECC.

## 2. INTRODUCTION

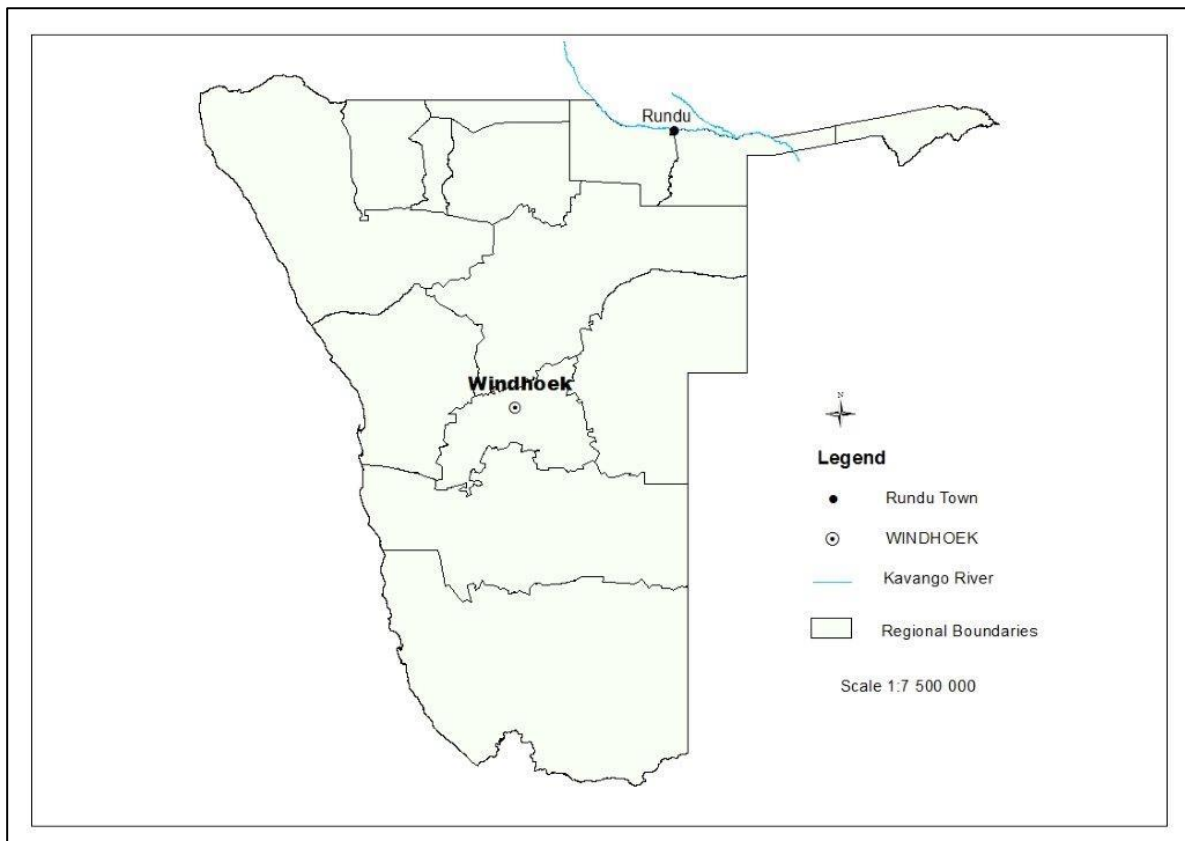
Rundu is the capital of the Kavango-East Region, northern Namibia, on the border with Angola on the banks of the Kavango River about 1,000 metres above sea level. The bulk water supply infrastructure in Rundu consists of two separate schemes, namely the Rundu and Nkarapamwe schemes.

Both schemes abstract raw water from the Okavango River and after treatment and disinfection, potable water is supplied to various consumers, including the Rundu Town Council, the Military Base at the Airport, Government Institutions, Industries, Businesses and Private Consumers.

Although the two schemes are interlinked at the two river abstraction facilities, the schemes and their components will be discussed separately.

The location of Rundu is depicted in **Figure 1**.

The EMP is for an existing water supply scheme and it is therefore only for the operation and maintenance of the scheme.



**Figure 1: Rundu Location Map**

### **3. EXISTING RUNDU WATER SUPPLY INFRASTRUCTURE**

#### **3.1 Water Source**

The Rundu Water Supply Scheme (WSS) source of raw water is abstracted from the Okavango River and after treatment and disinfection, clean water is supplied to numerous clients.

##### **3.1.1 Rundu WSS**

Water is abstracted using three pumps installed in an abstraction tower, from where the water is pumped through two 200 mm AC pipelines to pressure sand filters and then into three ground level reservoirs. From here the water is pumped into two towers, which feed the town's reticulation system.

##### **3.1.2 Nkarapamwe WSS**

It consists of inclined raw water pumps, a booster pump station, pressure sand filters, chlorine dosing system, a 9 000 m<sup>3</sup> reservoir, the Nkarapamwe pump station, distribution to Kaisosi and the gravity pipeline to the airport.

A schematic layout of the existing infrastructure is indicated in **Figure 2** below.

#### **3.2 Water Quality and Disinfection**

The quality of water supplied to Rundu was evaluated for compliance with the guidelines presented in the Water Act, 1956 (Act 54 of 1956), Namibian Water Quality Guidelines (NWQG) and the draft Namibian Water Quality Standards (NWQS) as contained in the draft regulations of the Water Resources Management Act of 2013.

According to the NWQG the water can be classified as Group B (see appendix attached).

#### **3.3 RUNDU WATER SUPPLY SCHEME**

Rundu water supply scheme was originally constructed to supply water to the town and the Rundu Airport.

##### **3.3.1 Pipe Work**

###### **3.3.1.1 Raw Water Pipeline**

The water from the tower is pumped through a 20 m long 200NB steel pipe, which then branches into two parallel pipelines each 1.1 km long. The older pipeline is a 200NB COD class C FC pipeline, whereas the newer pipeline is a 200NB class 18 FC pipeline. Both lines can be operated at a pressure of 90 mwh and the combined capacity is 284 m<sup>3</sup>/h.

##### **3.3.2 Reservoirs**

The water at the Rundu scheme flows from the pressure sand filters, into three concrete ground level reservoirs with a combined capacity of 5 682 m<sup>3</sup>.

The elevated concrete reservoir has a capacity of 182 m<sup>3</sup> and is filled once a month. It only supplies water to the workshop of the Department of Water Affairs and all consumers previously supplied from this tank have been connected to the Industrial Tower. Water is also pumped from the ground level reservoirs into a 270 m<sup>3</sup> elevated Braithwaite tank, located close to the Industrial Area.

### **3.3.3 Power Supply and Control System**

All operations and monitoring is done manually, except for the clear water pumps supplying the Industrial Tower, which is level actuated.

#### **3.3.3.1 River Pump Station**

The pump station is situated in an abstraction tower in the Okavango River. Three vertical, electrically driven multistage submersible pump sets are installed, of which two can operate simultaneously with the other pump as standby. One pump supplies 158 m<sup>3</sup>/h and two pumps supply 230 m<sup>3</sup>/h to the filters at the Rundu WSS site.

Power is supplied to the pump station from NORED's 11 kV/400 V-630 kVA transformer mounted on concrete pedestals outside the pump station yard.

The tower pumps and with that the inflow into the ground level reservoirs is controlled manually.

#### **3.3.3.2 Clear Water Pump Station**

Two sets of clear water pumps are installed, each set consisting of two pumps in parallel. One set supplies water to the elevated concrete reservoir, the other water to the Industrial Tower. The maximum capacity of the two clear water pump sets (Rapid Allweiler T 80-160) is 300 m<sup>3</sup>/h to the elevated concrete reservoir and 190 m<sup>3</sup>/h to the Industrial Tower (Sulzer 32-200).

Power is supplied to the pump station via a mini substation located outside the pump station premises. The mini substation is NORED's property.

The pumps are automatically operated via float switches in the elevated reservoirs. Starting of the pumps is initiated by a timer.

### **3.4 NKARAPAMWE WATER SUPPLY SCHEME**

Consumers supplied by this WSS include the Rundu airport and the two military bases, one at the airport itself, and the other east of the road. The water gravitates to both consumers from the Nkarapamwe reservoir.

#### **3.4.1 Pipe Work**

##### **3.4.1.1 Raw Water Pipeline**

The inclined river pumps deliver into a 350 mm diameter FC pipe, which conveys the water via the inline booster pump station to the pressure filters and finally the reservoir situated 4.0 km to the south east of the abstraction point. The pipeline is class 18 for the first 600 m (up to the inline booster pump station) and class 12 for the rest of the line, with a maximum capacity of 490 m<sup>3</sup>/h.

##### **3.4.1.2 Pipeline to Airport**

Water is distributed from the 9 000 m<sup>3</sup> reservoir to the clear water pumps and to a gravity pipeline that splits to supply Kaisosi and the airport. A water meter is installed at the split to Kaisosi and from this point the pipeline belongs to the Town Council. The N'karapamwe Defence pipeline up to and including the ground reservoir at the airport site belongs to NamWater. Under gravity conditions the capacity of this 250 mm diameter pipe is 100 m<sup>3</sup>/h.



### **3.4.2 Reservoirs**

After the water has been filtered and chlorinated, it is stored in a 9 000 m<sup>3</sup> double compartment ground level concrete reservoir. Another two concrete ground level reservoirs belonging to NamWater, with capacities of 750 m<sup>3</sup> and 2 000 m<sup>3</sup>, are located at the airport/military base complex outside Rundu. These two reservoirs are gravity fed from the 9 000 m<sup>3</sup> reservoir via a 250 mm class 12 FC pipeline, approximately 7.6 km long. A 540 m<sup>3</sup> Braithwaite head tank provides elevated storage at the airport/military base.

The combined clear water storage capacity of all reservoirs and the elevated tower at the airport/military base is 12 290 m<sup>3</sup>, while the total elevated storage capacity available is 540 m<sup>3</sup> (at the airport).

### **3.4.3 Power Supply and Control System**

All operations and monitoring is done manually.

#### **3.4.3.1 River Water Pumps**

Three submersible, incline mounted multistage pumps in 300 NB sleeves deliver raw water from the Okavango River to the pumping main. The pumps are installed in parallel and are operated with two pumps at a time with the third one on standby. The actual capacity with the dual operation modus is 258 m<sup>3</sup>/h.

The same transformer that supplies electrical power to the abstraction tower is used for the inclined pumps.

The pumps are operated automatically and can be controlled via telemetry. Float switches are located in the reservoir at the Nkarapamwe scheme site and provide the relevant information on the water levels to the pumps.

#### **3.4.3.2 Booster Pump Station**

Three Stork-Len CEN50-400 pumps with Siemens 75 kW motors are installed in parallel. The pump station was sized to accommodate five pumps in a 4 plus 1 configuration, but currently only two pumps and a standby pump have been installed.

Power to the pump station is supplied from an 11 kV/400 V – 500 kVA transformer located in a building adjacent to the pump station building. A 600 A circuit breaker is installed in the distribution board fixed to the external wall of the pump station. The transformer is the property of NORED. The pumps are controlled manually and are switched on when required.

#### **3.4.3.3 Clear Water Pumps**

Four centrifugal pumps are installed in parallel, with the first being a jockey pump. The pumps convey water to the suburbs of Nkarapamwe, Ndama, Safari, Kehemu and Donkerhoek. 270 m<sup>3</sup>/h are delivered into the Town Council Reservoir and directly into the distribution network. Pump set 2 (KSB ETA 150/315) has the largest capacity of approximately 280 m<sup>3</sup>/h.

Electrical power is supplied via an 11 kV/400 V – 200 kVA NORED pole mounted transformer situated in the corner of the pump station yard. A 225 A circuit breaker has been provided. The pumps are mainly operated on a timer, and are switched off between 21:00 and 5:00, but also switch off due to a Level-dex valve in the tower.

### **3.5 Scheme Processes/Operation**

There is one fulltime NamWater operator based in Rundu and Nkarapamwe.

### **3.6 Maintenance**

Maintenance is done by a permanent NamWater team.

#### **3.6.1 Pumps**

All motors bearings should be lubricated with a high-temperature lithium-based grease after 3000 hours.

If a pump/s were out of operation for six months, lubrication is required before service commence on all motor bearings.

#### **3.6.2 Air Valves**

The valves must be opened monthly to be descaled and cleaned to ensure effective operation. The service intervals will depend on the severity of the conditions.

#### **3.6.3 Pressure Gauges and Transducers**

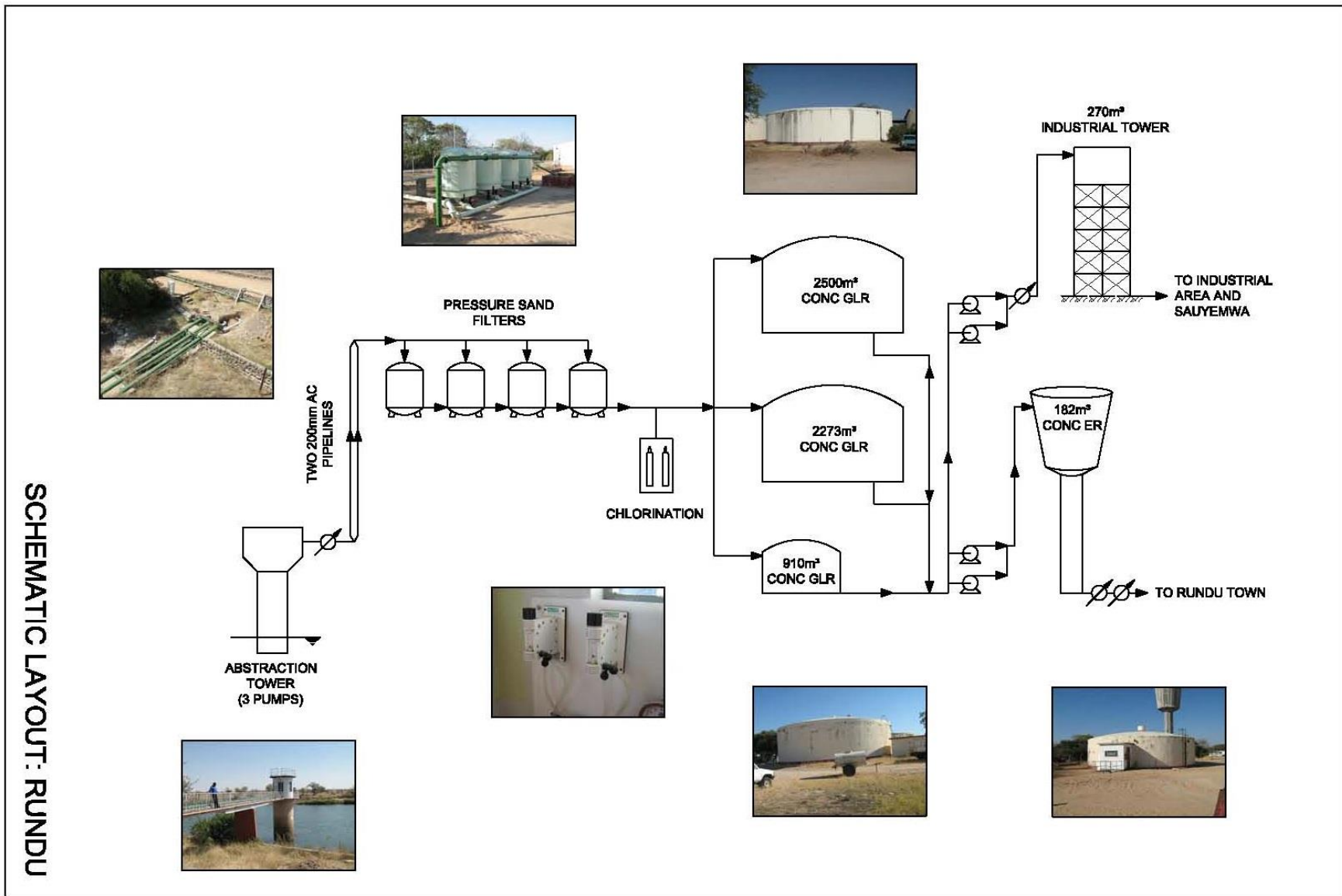
The gauge cocks must be turned monthly to bleed-off air and ensure accurate readings. Turning prevents scale accumulation which prevents the gauge cock from functioning. The operational or service intervals will depend on the severity of the conditions.

#### **3.6.4 Reservoirs**

The reservoirs should be checked for leaks and other damages on a monthly basis. If leaks are detected, it should be fixed immediately.

#### **3.6.5 Pipe Breaks/leaks**

Monthly monitor of pipes should be done to avoid wastage of water in an event a major pipe break. The pipeline corridor for maintenance work is 10 m by 5 m.



**Figure 2: Rundu Scheme Layout**

## 4. BRIEF DESCRIPTION OF THE RECEIVING ENVIRONMENT

The baseline description provided below focuses on the receiving environment:

### 4.1 Climate

Rundu has a hot semi-arid climate, with hot summers and relatively mild winters (with warm days and chilly to cool nights). Even though it has a hot semi-arid climate, the area experiences high diurnal temperature variation during the winter (Mendelsohn, *et al.*, 2009).

#### 4.1.1 Precipitation

The driest month in the area is June, while the most precipitation falls in January, with an annual rainfall of 550 mm to 600 mm. July is the driest month in the area, whilst, January is the wettest month (Mendelsohn, *et al.*, 2002).

#### 4.1.2 Temperature

The warmest month of the year is October. In July, the average temperature is reaches the lowest temperature of the whole year. The average maximum temperature is measured to be between 34 °C to 36 °C, whereas, the average minimum temperature during the coldest month of July is between 4 °C to 6 °C respectively (Mendelsohn, *et al.*, 2002).

### 4.2 Geology

The Okavango Basin is part of the greater Kalahari Basin, which covers most of the northern and eastern parts of Namibia and extends across the Namibian border into Botswana and Angola. The bedrock underlying the basin filled with Kalahari Sequence deposits consist of basal rocks of the Damara Sequence, followed by the Karoo Sequence sediments, overlain and intruded by volcanics of Karoo age. The unconsolidated to semi-consolidated clay, sand and gravel of the Kalahari Sequence fill the Okavango Sub-basin, which deepens from the northeast towards the northwest, from 0 to > 400 m along the north-west trending basin axis. The basin axis stretches from the northwest corner of former Bushmanland through the south-western Kavango Region and from there into the Ohangwena Region. Sub-outcrops of volcanic rock occur at the Okavango River near Rundu and between Mukwe and Bagani (Christelis *et al.*, 2011).

### 4.3 Natural Fauna and Flora

According to Mendelsohn, *et al.*, (2009) the fauna found in the area include: oribi (*Ourebia ourebi*), zebra (*Equus quagga*), wild dog (*Lycaon pictus*), elephant (*Loxodonta*), buffalo (*Syncerus caffer*), springbok (*Antidorcas marsupialis*), roan (*Hippotragus equinus*), sable (*Martes zibellina*), kudu (*Tragelaphus strepsiceros*) and impala (*Aepyceros melampus*). The wildlife is protected by several nature reserves in the region, such as Caprivi Game Park, Mahango Game Reserve, Mudumu, Lizauli, West and Mamili National Park; animals travel freely across the unmarked border with Botswana, where the Chobe National Park is located. The region is a popular game and prime bird-watching area spot.

The study area is situated in the woodland savannah vegetation structure and the vegetation species includes: devil's claw (*Harpagophytum*), black-thorn (*Acacia mellifera*), camel thorn (*Acacia erioloba*), sweet-thorn (*Acacia karroo*), yellow-bark acacia (*Acacia erubescens*), baobabs (*Adansonia*), makalani palms (*Hyphaene Petersiana*), wild syringa (*Burkea africana*), shepherd tree (*Boscia albitrunca*), copalwood (*Guibourtia coleosperma*) and the zambezi teak (*Baikiaea plurijuga*) (Mendelsohn, *et al.*, 2009).

## 5. THE LEGAL ENVIRONMENT

A legal review was done and the key laws of concern include those which protect the ecological integrity of the Rundu ecosystem and its water resource, including the Water Act of 1954 and the Water Resources Management Act of 2004, and applicable international treaties such as the Convention on Biological Diversity. These laws and conventions place Namibia under an obligation to conserve the ecological integrity of the Rundu ecosystem for the sustainable use by Namibians.

### 5.1 The Constitution of the Republic of Namibia

There are two clauses contained in the Namibian Constitution that are of particular relevance to sound environmental management practice, viz. articles 91(c) and 95(l). In giving effect to articles 91(c) and 95(l) of the Constitution of Namibia, general principles for sound management of the environment and natural resources in an integrated manner have been formulated. The formulation of these general principles resulted in the Namibia's Environmental Assessment Policy of 1994. To give statutory effect to this Policy, the Environmental Management Act was approved in 2007, and gazetted as the Environmental Management Act (Act No. 7 of 2007) (herein referred to as the EMA. As the organ of state responsible for management and protection of its natural resources, MET: DEA is committed to pursuing the 13 principles of environmental management that is set out by Part 2 of the Act.

To summarise, Articles 91(c) and 95(l) refer to:

- Guarding against over –utilisation of biological natural resources;
- Limiting over-exploitation of non-renewable resources;
- Ensuring ecosystem functionality
- Protecting Namibia's sense of place and character;
- Maintaining biological diversity and
- Pursuing sustainable natural resource use.

### 5.2 Environmental Assessment Policy (1995)

Cabinet endorsed Namibia's Environmental Assessment Policy in 1995 as the first formal effort in Namibia to regulate the application of environmental impact assessments and environmental management. Amongst others, the Policy provides a procedure for conducting EIA's which sets out to:

- Better inform decision makers and to promote accountability of decisions taken;
- Strive for a high degree of public participation and involvement of all sectors of the Namibian community during the execution of the EIA;
- Take into account the environmental costs and benefits of projects and Programmes;
- Promote sustainable development in Namibia;
- Ensure that anticipated adverse impacts are minimized and that positive impacts are maximized.

### 5.3 Environmental Management Act (No 7 of 2007) (EMA)

The Environmental Management Act (EMA) was promulgated in 2007 by Parliament and gives effect to the Environmental Assessment Policy. The Act specifies the environmental assessment procedures to be followed as well as the listed activities (activities that require an EIA).

Of relevance to this project are the following listed activities, as provided in Section 27 of this Act, which include:

- Water use and disposal;
- Transportation

**5.4 EIA Regulations Government Notice No. 30, promulgated on 6 February 2012**

The regulations, promulgated in terms of the EMA, were promulgated on 6 February 2012 and indicated certain activities that require an Environmental Clearance from MET: DEA prior to commencing.

**5.5 Water Act 54 of 1956 and Water Resources Management Act 11 of 2013**

The Water Resources Management Act 11 of 2013 is presently without regulations; therefore the Water Act 54 is still in force. The Act provides for the management and protection of surface and groundwater resources in terms of utilisation and pollution.

## 6. RESPONSIBLE PARTIES

NamWater's Environmental Manager is primarily responsible for the implementation of the EMP during the operational and maintenance phases.

### 6.1 NamWater

NamWater, as the implementing agency, is responsible for:

- Ensuring that the management actions are being adhered to;
- Ensuring that all environmental impacts are managed according to the environmental principles of avoiding, minimizing, mitigating and rehabilitation. This will be achieved by successful implementation of the EMP;
- Ensuring that appropriate monitoring and compliance auditing are executed;
- Ensuring that the environment is rehabilitated to its natural state as far as possible.

NamWater shall ensure that all employees attend an Environmental, Awareness Training Course. This course shall be structured to ensure that attendees:

- Become familiar with the environmental controls contained in the EMP;
- Are made aware of the need to conserve water and minimise waste;
- Are made aware of NamWater's Code of Conduct;
- Are aware that a copy of the EMP is readily available at the plant and that all staff are aware of the location and have access to the document;
- Are informed that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) will be placed at prominent locations throughout the site.

## **7. ENVIRONMENTAL MANAGEMENT PLAN**

An Environmental Management Plans (EMP) is an important tool focusing on the management actions that are required to ensure environmental compliance of a particular project.

EMP implementation is a cyclical process that converts mitigation measures into actions and through cyclical monitoring, auditing, review and corrective action, ensures conformance with stated EMP aims and objectives. Monitoring and auditing, feedback for continual improvement ensures that environmental performance has been provided and corrective action is taken for an effective EMP.

The main aim of this EMP is to ensure that the project complies with the goals of the Namibian Environmental Management Act (No. 7 of 2007); and, more specifically, to provide a framework for implementing the management actions as described in the EMP for the operational and maintenance phases of the scheme. Best practice is proposed for the operation of the scheme.

There are some environmental impacts that cannot be avoided. These environmental impacts require mitigation, and in order to mitigate against these impacts an EMP is required. The EMP aims to ensure best practises are implemented and environmental degradation is avoided through appropriate environmental protection, adherence to legal requirements and maintaining good community relationships.

MET indicated that EMP's for existing operations are sufficient.

The project activities are grouped according to the different operational processes and stages. Most of the impacts can be reduced through good housekeeping.



## **8. MANAGEMENT ACTIONS**

### **8.1 Operation and Maintenance phase of the Rundu Water Supply Scheme**

#### **8.1.1 Introduction**

The Operational Phase Section relates to the management and mitigation measures required to ensure that the continuation of the bulk water supply network and the maintenance of the infrastructure is operated in a manner that demonstrates responsible, precautionary environmental management.

The EMP will address specific areas of concern in terms of the long-term environmental management of the affected environment and is intended to serve as a guide to the on-going management of the water supply scheme site as well as the affected environment. The EMP will therefore aim to provide NamWater with the necessary tools to ensure that the potential impacts on the natural environment of the site during the operation of the water supply scheme are minimised. Moreover, it will aim to ensure that the infrastructure is operated and maintained according to Best Practice, in an environmentally sensitive and sustainable manner, and that the operation of the infrastructure does not result in reasonably avoidable environmental impacts.

**Table 1: Operation and Maintenance Phase Management Table**

Issue	Objective	Strategy	Actions	Time frame
Maintenance and emergency procedures	To ensure correct procedures are in place to avoid environmental impacts associated with maintenance activities as well as proactive intervention to avoid, and if required, to respond to emergencies	<ul style="list-style-type: none"> <li>• Establish environmentally sensitive and technically sound maintenance procedures as well as reporting structures.</li> <li>• Compile a staff competency assessment and training programme.</li> <li>• Establish emergency procedures to ensure appropriate response and minimise potential risk to the biophysical and social environment.</li> </ul>	<ol style="list-style-type: none"> <li>1. Establish regular reporting procedures on maintenance</li> <li>2. Undertake regular inspection and maintenance of all infrastructure to ensure in working order and to assess damaged / deficient equipment, as per the O&amp;M Manual.</li> <li>3. Review, and if necessary, revise maintenance manual.</li> <li>4. Establish emergency procedures guidelines for the blockage/failure, flooding, contaminant removal and disinfection, power failure and fire of the scheme.</li> <li>5. Implement the response procedures when emergency incident occurs.</li> <li>6. Complete the incident report checklist in the case of emergency and keep with monitoring records for submission.</li> <li>7. Undertake annual education course for all operational staff.</li> <li>8. Review, and if necessary revise emergency manual.</li> </ol>	<p>Bi-monthly for the lifespan of infrastructure as per the maintenance manual.</p> <p>Bi-annually for lifespan of works.</p> <p>When emergency incident occurs.</p> <p>Emergency incident</p> <p>Annually for lifespan of operation.</p> <p>Annually for lifespan of operation</p> <p>Annually for lifespan of operation</p>

## **8.2 Maintenance Procedures**

The optimal operation and effective maintenance of all the scheme components is important in protecting the environment and ensuring that resources are not wasted and environmental incidents arising out of equipment or infrastructure failures, are avoided. Operation and Maintenance Manuals are available for the RunduWater Treatment Works (WTW). The manuals provide a detailed guidance on the operation of all machinery and associated systems as well as related maintenance procedures, including maintenance schedules. Implementation of this manuals by NamWater will facilitate the proactive management of potential risks and thus result in impacts on the receiving environment being averted.

The maintenance procedures set out in the manuals, provides specific guidance in terms of the monitoring and maintenance of the scheme components. These procedures will specify the equipment item and specific component of each piece of equipment requiring checking, the scope and nature of the check that is to be carried out including detailed instructions related to the specific check, and the programme for conducting each check.

## **8.3 Facility Management and Operations**

NamWater shall ensure that sufficient budget allocations and provisions are made available to ensure that the infrastructure can be adequately operated and maintained. NamWater must also attend to damage to the scheme components resulting in water loss as a matter of high priority.

## **8.4 Routine Maintenance and Repairs**

The condition of the infrastructure shall be inspected routinely and a maintenance list compiled. Identified, preventative maintenance issues shall be undertaken as soon as possible. Any wastes arising from the repair and maintenance work must be removed and disposed-off at a designated waste deposal site as part of the operation.

## **8.5 Environmental Awareness**

Instilling a sense of environmental awareness and consideration in all employees, but especially those involved with the scheme operations is vital to the overall success of any environmental management plan. It is therefore recommended that a general environmental awareness course for the Scheme Staff Members, who may be required to carry out duties on the scheme, be undertaken.

## **8.6 Waste and Pollution Management**

### ***8.6.1 Waste and Pollution Prevention***

To prevent the improper disposal of waste and to prevent pollution, the following management actions shall be enforced:

- All waste will be removed to an appropriate waste dump.
- No waste should be buried.
- General Waste: Includes waste paper, plastic, cardboard, harmless organic (e.g. vegetables) and domestic waste.
- No littering will be allowed. The plant area will be kept free of waste at all times.
- Provide sufficient waste bins at worksites. Make sure that all waste is removed from the worksites.

- Hazardous Substances include: sewerage, fuels, lubrication oils, hydraulic and brake fluid, solvents, paints, anti-corrosives, insecticides and pesticides, chemicals, acids etc. It should be disposed of at designated hazardous disposal sites.
- Contaminated soil should be stored in drums and taken to the nearest appropriate waste dumpsite.
- Do not change oil on uncovered ground. Drip trays will be used to catch oil when vehicles are repaired in the field.
- Used oil and hydraulic fluids will not be discarded on the soil or buried. It will be removed from site and taken back to an appropriate dump.
- In the event of a hazardous spill:
  - ✓ Immediately implement actions to stop or reduce the spill.
  - ✓ Contain the spill.
  - ✓ Arrange implementation of the necessary clean-up procedures.
  - ✓ Collect contaminated soil, water and other materials and dispose it at an appropriate waste dumpsite.
- Used solvents and grease should be stored in drums or other suitable containers. It should be sealed and recycled or disposed at an appropriate disposal site.
- Hazardous waste should not be burnt.
- Bunding, concrete slabs and/or other protective measures should be installed where hazardous materials are handled.
- Ensure that the staff are informed and have information pertaining to the management of spills or ingestion.

### **8.6.2 Hazardous Materials**

Where hazardous materials are required for repair and maintenance work (including fuels and oils), care will be taken to ensure that a competent individual is appointed to enforce the responsible use of such materials. The operational staff or maintenance teams shall carry a copy of the relevant Material Safety Data Sheet (MSDS) whenever using such materials. The Scheme Supervisor shall ensure that persons working with hazardous materials have been trained in the handling of such substances, as well as in emergency procedures to be followed in the event of an accidental spillage or medical emergency. Maintenance teams shall also carry a spill kit containing the appropriate neutralizing chemicals, absorbent materials and other relevant equipment required to undertake a clean-up of any spill that may occur.

### **8.6.3 Noise Management**

During maintenance operations, all silencing mechanisms on all equipment must be in a good state of repair. Except for in emergency situations, no amplified sound may be broadcast. All routine maintenance shall be restricted to daylight hours.

## **8.7 Health and Safety**

To minimise the risk of HIV infection and the increase of STI's and the occurrence injuries the following management actions shall be enforced:

- Provide an AIDS awareness programme to all the staff.

- Make sure that all staff are equipped and know how to use safety and protective gear. This includes hard hats, goggles, hearing protectors, dusk masks, steel-toed shoes etc.
- Keep a comprehensive first aid kit at Scheme.
- Establish an emergency rescue system for evacuation of serious injured people.
- Emergency procedures for accidents should be communicated to all employees.
- Dangerous areas must be clearly marked and access to these areas controlled or restricted.
- Good driving and adherence to safety rules will result in a minimum number of road and workplace accidents.
- Fire extinguishers must be available at all refuelling sites. Staff should be trained to handle such equipment.
- Nobody is allowed to dispose a burning or smouldering object in an area where it may cRundue the ignition of a fire.
- Hazardous substances must be kept in adequately protected areas to avoid soil, air or water pollution.
- Work areas, such as these for the maintenance of equipment, must be on concrete slabs.
- Explosives should be stored according to the prescribed regulations.

## 9. SITE CLOSURE AND REHABILITATION

Rehabilitation is the process of returning the land in a given area that has been disturbed by construction and earthworks to some degree of its former state, or an otherwise determined state. Many projects, if not all, will result in the land becoming degraded to some extent. However, with proper rehabilitation most impacts associated with the reservoir construction project, could be mitigated and restored to an acceptable level. Poorly rehabilitated construction areas provide a difficult legacy issue for governments, communities and companies, and ultimately tarnish the reputation of operators as a whole.

Objectives of proper site closure and rehabilitation include the following:

- Reduction or elimination of the need for a long-term management program to control and minimise the long-term environmental impacts;
- Clean-up, treatment or restoration of contaminated areas (e.g. soils contaminated by oil or fuel spills, concrete spills, etc.). Excavation of contaminated material and disposal thereof in an acceptable manner.

Rehabilitation measures to implement:

- a. A site inspection will be held quarterly by the scheme supervisor after every maintenance work during operation of the scheme. Rehabilitation will be done to the satisfaction of the ENV section and MET.
- b. Frequent inspections of the scheme and effective follow-up procedures, to prevent minor defects from becoming major repair jobs.
- c. Make sure all soil polluted during maintenance work is properly stored in drums and removed to an appropriate waste dump.
- d. Make sure all windblown litter is removed once maintenance has seized.
- e. Make sure that all potential hazards (i.e. the sewerage pit) are properly closed and left in a safe and neat position.

Rehabilitation will be completed when the above have be achieved.

## 10. NAMWATER ENVIRONMENTAL CODE OF CONDUCT

### **What is an Environmental Code of Conduct?**

It is a set of rules that everybody has to follow in order to minimise damage to the environment.

### **What is the ENVIRONMENT?**

The ENVIRONMENT means the surroundings within which people live. The ENVIRONMENT is made up of the **soil, water, plants, and animals** and those characteristics of the soil, water, air, and plant and animal life that influence **human health and well-being**. **People and all human activities** are also part of the environment and have to be considered during the operation of the Scheme.

### **Do these ENVIRONMENTAL RULES apply to me?**

YES, The Environmental Rules apply to EVERYBODY. This includes all permanent, contract, or temporary workers as well as any other person who visits the Scheme. Every person will be required to adhere to the Environmental Code of Conduct.

### **ALL PERSONNEL must study and keep to the Environmental Code of Conduct**

The SCHEME SUPERVISOR will issue warnings and will discipline ANY PERSON who breaks any of the Environmental Rules. Repeated and continued breaking of the Rules will result in a disciplinary enquiry and which may result in that person being asked to leave the Scheme permanently.

### **What if I do not understand the ENVIRONMENTAL RULES?**

ASK FOR ADVICE, if any member of the WORKFORCE does not understand, or does not know how to keep any of the Environmental Rules, that person must seek advice from the SCHEME SUPERVISOR. The PERSON that does not understand must keep asking until he/she is able to keep to all the Environmental Rules.

### **Safety and Security**

1. Only enter and exit roadways and construction areas at demarcated entrances.
2. Wear protective clothing and equipment as per signboards at the Scheme and according to instructions from your SCHEME SUPERVISOR.
3. Report to your SCHEME SUPERVISOR if you see a stranger or unauthorised person in the construction area.
4. Never enter any area that is out of bounds or that is demarcated as dangerous without permission of your SCHEME SUPERVISOR.
5. Never climb over any fence or enter private property without permission of the landowner or your SCHEME SUPERVISOR.
6. Do not remove any vehicle, machinery, equipment, or any other object from the construction site without the permission of your SCHEME SUPERVISOR.
7. Keep clear of blasting sites. Follow the instructions of your SCHEME SUPERVISOR.
8. Never enter or work in the Scheme while under the influence of alcohol or other intoxicating substances.
9. All staff should know the emergency procedures in case of accidents.

### Waste Disposal

10. Learn the difference between different types of waste, namely:
  - general waste, and
  - hazardous waste.

Containers will be provided for different types of wastes.

**General Waste includes waste paper, plastic, cardboard, harmless organic (e.g. Vegetables) and domestic waste**

**Hazardous Waste includes objects, liquids or gases that are potentially dangerous or harmful to any person or the environment. Sewage, fuel, tyres, diesel, oils, hydraulic and brake fluid, paints, solvents, acids, soaps and detergents, resins, old batteries, etc. are all potentially hazardous.**

11. Learn how to identify the containers for the different types of wastes. Only throw general waste into containers, bins or drums provided for general waste.
12. Recycle drums, pallets and other containers.
13. Never bury or burn any waste on site, all waste is to be disposed in allocated refuse disposal containers, bins or bags.
14. Never overfill any waste container. Inform your SCHEME SUPERVISOR if you notice a container that is nearly full.
15. Do not litter.
16. Do not bury litter or rubbish in the backfill trench.

### Plants and Animals

21. **Do not ever pick any plants, or catch any animal.** People caught with plants or animals in their possession will be handed to the authorities for prosecution.
22. Never feed, tease, play with, or set devices to trap any animal or livestock. Wild animals are not to be domesticated.
23. Keep off the rock outcrops unless given specific permission by the SCHEME SUPERVISOR to be there.
24. Never cut down any tree or branches for firewood.
25. Never leave rubbish or food scraps or bones where it will attract animals, birds, or insects.
26. Rubbish must be thrown into allocated waste disposal bins/bags.
27. Always close the gates behind you.

### Preventing Pollution

28. Only work with hazardous materials in bunded areas.
29. Never discard any hazardous substances such as fuel, oil, paint, solvent, etc. into stream channels or onto the ground. Never allow any hazardous substances to soak into the soil.
30. Clean up spills immediately.
31. Immediately report to your SCHEME SUPERVISOR when you spill, or notice any hazardous substance overflow, leak or drip or spill on site, into the streambeds or along the road.



32. Immediately report to your SCHEME SUPERVISOR when you notice any container, which holds hazardous substances overflow, leak or drip. Spillage must be prevented.
33. Only wash vehicles, equipment and machinery, containers and other surfaces at work site areas designated by your SCHEME SUPERVISOR.
34. Do not change oil on uncovered surfaces.
35. If you are not sure how to transport, store, use, or get rid of any hazardous substances ask your SCHEME SUPERVISOR for advice.

#### **Health**

36. Drink lots of clean water every day.
37. Use toilets that have been provided.
38. Take the necessary precautions to avoid contracting HIV / AIDS. Condoms are available at most Clinics.
39. Inform your SCHEME SUPERVISOR when you are sick.
40. Do not work with any machinery when you are sick.
41. If you are working in malaria areas, you must take the necessary precautions.

#### **Dust Control**

42. Do not make any new roads or clear any vegetation unless instructed to do so by your SCHEME SUPERVISOR.
43. Keep to established tracks and pathways.
44. Keep within demarcated work areas.

#### **Saving Water**

47. Always use as little water as possible. Reduce, re-use and recycle water.
48. Never leave taps or hose pipes running. Close all taps after use.
49. Report any dripping or leaking taps and pipes to your SCHEME SUPERVISOR.

#### **Working Hours**

50. You may only work on weekends and after hours with the consent of the SCHEME SUPERVISOR.

#### **Archaeological and Cultural Objects**

52. If you find any archaeological, cultural, historical or pre-historical object on the construction site you must immediately notify your SCHEME SUPERVISOR.
53. Never remove, destroy, or disturb any cultural, historical, or pre- historical object on site.

**Cultural and Historical Objects include old buildings, graves or burial sites, milestones, old coins, beads, pottery and military objects.**

**Pre-Historical objects include fossils and old bones, old human skeletal remains, pieces of pottery and old tools and implements.**

### **Sensible Driving**

54. Tracks and roads should be kept to a minimum. Where possible follow existing roads.
55. No off-road driving is allowed.
56. Never drive any vehicle without a valid licence for that vehicle class and do not drive any vehicle that is not road-worthy.
57. Never drive any vehicle when under the influence of alcohol.
58. **Always** keep your headlights on when driving on dusty roads.
59. Keep to the roads as specified by your SCHEME SUPERVISOR. Vehicles may only be driven on demarcated construction roads. Drivers should always use three points turns, “u-turns” are not allowed. Do not cut corners.
60. Do not drive on rocky outcrops.

### **Noise**

61. Keep noise levels as low as possible.
62. Do not operate noisy equipment outside normal working hours.

### **Fire Control**

63. Do not make open fires, use a drum or tin and do not collect any vegetation to burn.
64. Do not smoke or make fires near refuelling depots or any other area where fuel, oil, solvents, or paints are used or stored. Fireplaces should be at a safe distance from fuel and explosive storage sites as well as vehicle parking sites.
65. Cigarette butts should always be thrown in allocated refuse bins. Make sure that the cigarette butt is out before throwing it into the bin.
66. Immediately notify your SCHEME SUPERVISOR if you see an unsupervised fire at the campsite or construction site.

### **Dealing with Environmental Complaints**

67. If you have any complaint about dangerous working conditions or potential pollution to the environment, talk to your SCHEME SUPERVISOR.
68. If any person complains to you about noise, lights, littering, pollution, or any harmful or dangerous condition, immediately report this to your SCHEME SUPERVISOR.

**NP du Plessis**

**Tell: 061-71 2093**

**Cell: 081 127 9040**

**OR**

**Jolanda Murangi**

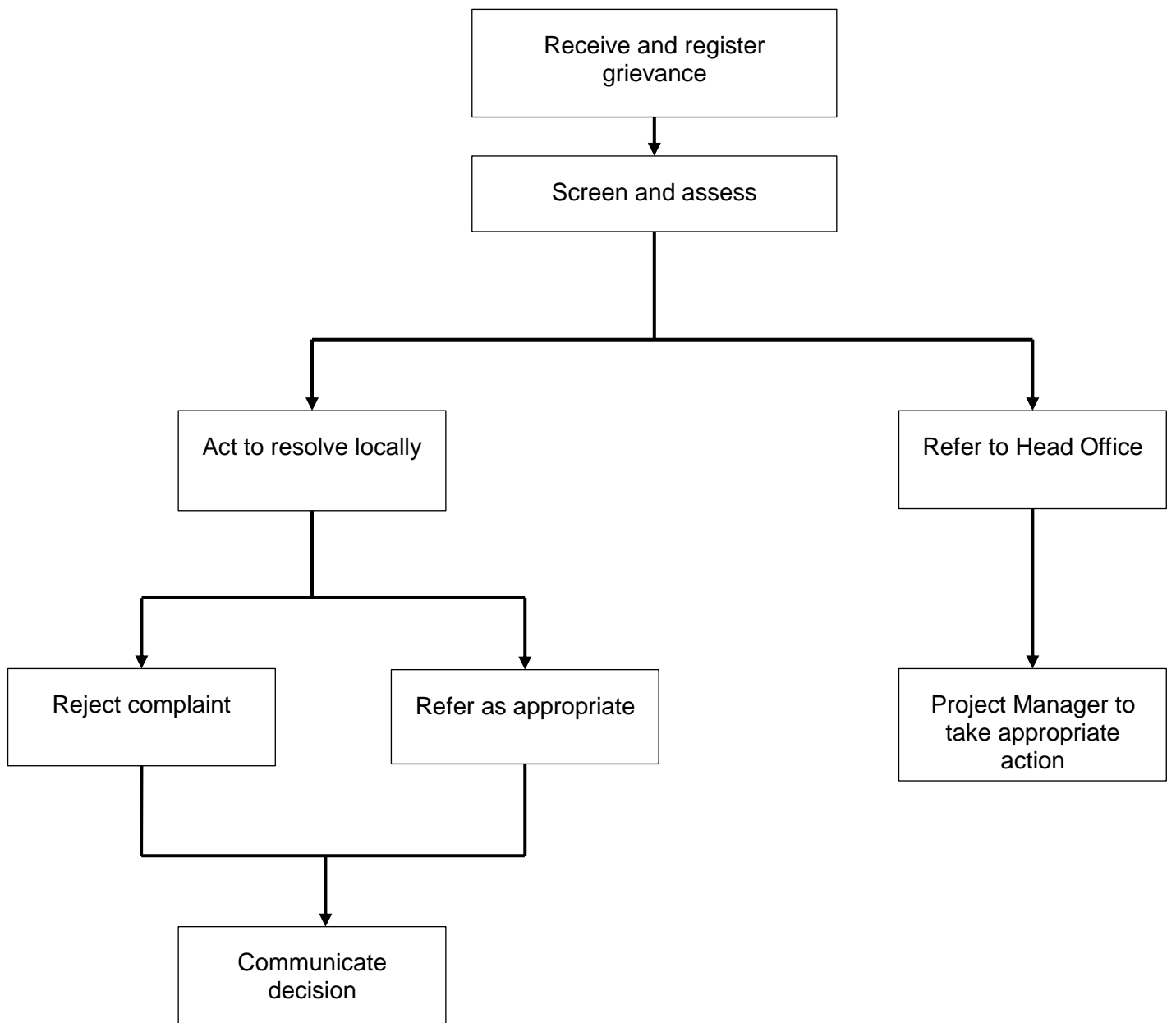
**Tell: 061-71 2105**

**Cell: 081 144 1528**

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**ANNEXURE 1: GRIEVANCE PROCEDURE AND REGISTRATION FORM**



Grievance Registration

Grievance Registration	
Case No:	Date:
Name of complainant:	Cell no:
	Email address:
Details of grievance: (Date, location, persons involved, frequency of occurrence, effects of ensuing situation, etc)	
Name of person recording grievance:	Cell number:
Proposed date of response:	
Signature of recording person:	Signature of complainant:
Date of redress:	
Decision and action:	