KARSTLAND BOREHOLES 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

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

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 Karstland Water 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

Karstland is situated in the Karst Area I, which is located between Kombat and Grootfontein.

The Karstland groundwater scheme consists of 17 boreholes out of which only 7 are in use. These boreholes abstract groundwater from Karst Area 1, a dolomite syncline extending from the farm Brandwacht in the east to a point 10 km west of Kombat Mine. The location of Karstland is depicted in **Figure 1.**

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

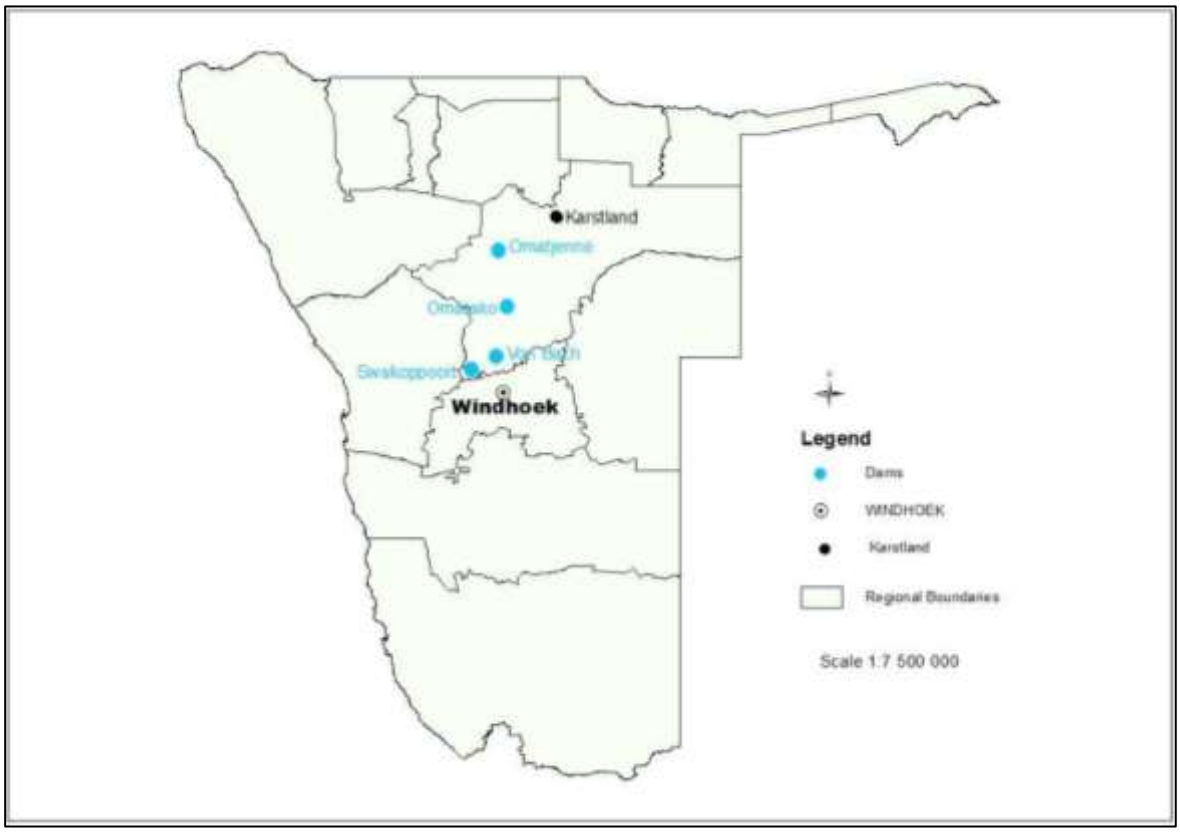

Figure 1: Karstland Boreholes Location Map

3. EXISTING KARSTLAND BOREHOLES WATER SUPPLY INFRASTRUCTURE

3.1 Water Source

Karstland area 1 is divided into the following 3 areas (also known as Phases):

Phase 1 (Brandwacht)

The Phase 1 scheme consists of only one borehole (WW 28565), which pumps the water through a single pipeline to the Grootfontein-Omatako canal. The pipeline terminates at the canal on the farm Uitkomst, 219 m downstream from the start of the canal.

Phase 2

Phase 2 is located to the west of phase 1 and east of the road to Rietfontein. It consists of 6 boreholes, of which 2 are located north of the B8 main road, while the rest are located between the B8 and the Grootfontein-Omatako canal.

The boreholes pump the water through a single collector pipeline to the Grootfontein-Omatako canal. The pipeline terminates approximately 15.9 km downstream from the start of the canal.

The Phase 2 scheme supplies water to farmers along the pipeline routine. All the surplus water not used by the farmer's flows into the canal.

Phase 3

There are 10 boreholes in Phase 3 with boreholes situated between Rietfontein and Kombat mine. The boreholes feed into a collector pipeline system, which transports the water to the Grootfontein-Omatako canal. The pipeline discharges into the canal approximately 30.5 km downstream from the start of the canal. The last section of this pipeline is also used to transport water from Kombat Mine to the canal. The Phase 3 boreholes are also mainly used to supply water to farmers along the pipe route and any surplus water flows into the canal.

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

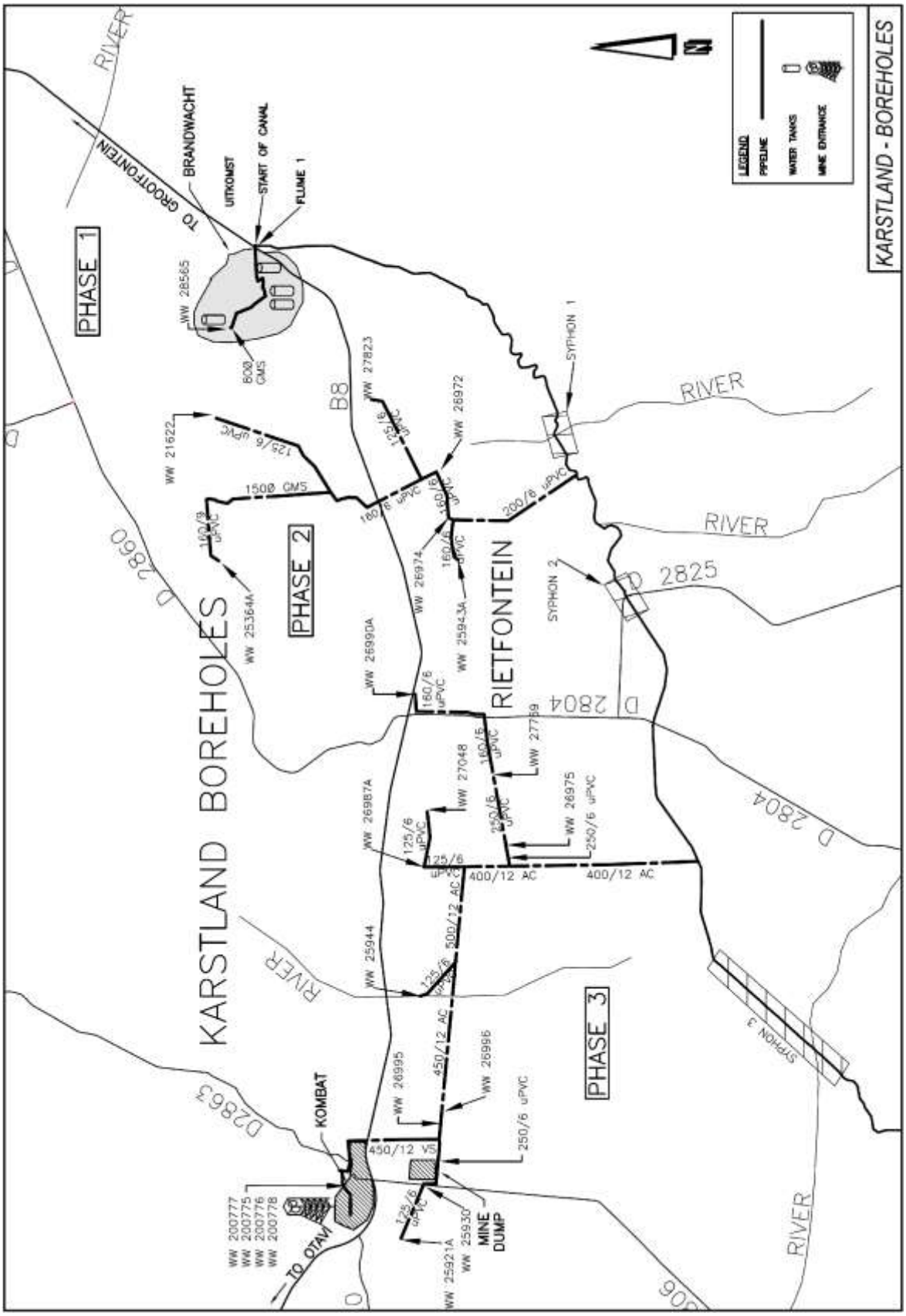

Figure 2: Karstland Boreholes – Ombinda Scheme Schematic

3.2 Water Quality and Disinfection

The quality of water supplied to Karstland Boreholes was evaluated for compliance with the NWQS and the NWQG. The quality of the water falls in Group B guidelines.

The dosing system provides chlorine (using standard 68 kg capacity bottles) for water after the booster pumps in the pressure line before the elevated water reservoir.

3.3 Pipe Work

Phase 1

Water is supplied from borehole WW 28565 via an 80 mm diam. GMS pipe, which runs above ground for approximately 520m. The first air release valve and tee-off to a 5 000 L plastic tank is 23 meters from the borehole. The water tank supply line is a 40 mm diam.

At the end of the GMS section the pipeline bends down and is buried from there onwards. The pipe is 160 mm diam. uPVC pipe and is approximately 2 700 m long. The first 1 100 m of the pipe is next to the service road on a plateau with a slight fall towards the canal. From there the pipe bends 90 degrees and flows down the escarpment to the canal 1 600 m away. The first 570 m section is very steep and from there the pipe follows the gradual ground slope towards the canal.

Phase 2

The pipe work from the boreholes are mainly uPVC class 6 for pipes for pipe diameters between 125 and 200 mm, with a short section of 160 mm diam. uPVC class 9 and a 150 mm GMS pipe section. The first 2.1 km of the pipeline consists of 160 mm diam. uPVC class 9 pipes. The second section of the collector line is 360 m long and installed above ground over rocky terrain.

Downstream of the GMS section the collector pipeline is a buried 160 mm diameter, this section is approximately 3.7 km long and extends to the first junction (pipeline from borehole WW 21622).

The branch pipeline from borehole WW 21622 is 4.6 km, 125 mm diam. uPVC class 6.
There's a 3.7 km long section of the collector pipeline between the first junction and the second junction (pipeline from borehole WW 27823) is constructed from 160 mm diam.

Phase 3

The branch pipeline from borehole WW 27823 transports the water to the second junction via a 125 mm diam. uPVC class 6 pipeline. This branch line is 3.2 km long. The branch pipeline from borehole WW 26974 to the fourth junction is 150m long and constructed from 125 mm diam. uPVC class 6 pipe. The size of the collector pipeline seems to increase to 200 mm diam. uPVC class 6. This section of pipeline is 180 m long with no air or scour valves.

The 160 mm diam. uPVC class 6 branch pipeline from borehole WW 25943A to junction number four is 1.4 km long. The first section of the collector line is a 125 mm diam. uPVC class 6 pipe with at length of 1.9 km, which transports the water from borehole WW 25921A to the first junction at borehole WW 25930.

The second section of the collector line is 1.4 km long and extends from the first junction connection at borehole WW 25930 to the Kombat junction. The 6.1 km long section of the collector pipeline between the Kombat junction and the first branch line (pipeline from borehole WW 25944) is constructed from 450 mm diam.

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There's a 3.0 km long section of the collector pipeline between the first branch line junction and the next (pipeline from borehole WW 26987A), is constructed from 500 mm diam. AC class 12 pipe. The second branch line transfers water from borehole WW 26987A to the collector line through a 125 mm diam. uPVC class 6 pipeline, which is 3.2 km long. The start of the pipeline is actually at borehole WW 27048, which is approximately 1.8 km upstream of borehole WW 26987A.

The first section of the third branch line is constructed from 160 mm diam. uPVC class 6 pipe and is 4.7 km in length. This section of pipeline starts at borehole WW 26990A and ends at the branch from borehole WW 27769 and is equipped with 4 air release valves and 2 scour valves. Borehole WW 27769 is in close proximity of the branch line and is connected with a short length of pipe.

From the junction at WW 27769 the branch line diameter increases to 250 mm and is constructed from uPVC class 6. This last section of the branch line is 3 km long and connects borehole WW 26975 at a location 700 m from the junction with the collector line.

From the third branch line connection the collector pipeline is 6 km long and constructed from a 400 mm diam. AC class 12 pipe.

3.4 Reservoirs

Phase 1

The storage facilities at the Brandwacht farm consist of the following reservoirs:

- A 5 000 L plastic water tank at borehole WW 28565, 2 x 5 m^3 GRP water tanks located at the housing complex.
- Next to the access road there is a 10 000 L plastic water tank on a concrete base.
- ***Phase 2***

There are no NamWater storage facilities on this system.

Phase 3

There are no NamWater storage facilities on this system.

3.5 Power Supply and Control System

The electrical infrastructure of the area consists of an 11 kV overhead power line reticulation with power supply points at each of the boreholes.

Brandwacht Power Supply Point

The Brandwacht supply point is an 11kV/400V 50 kVA pole mounted transformer which supplies power at 400V to the meter board mounted below the transformer. From the meter board with a main circuit breaker of 80A TP rating, power is fed to a distribution kiosk located near the transformer pole. The kiosk contains a 125A TP Heinemann JSO main circuit breaker, a 125A TP feed circuit breaker to the houses and a 70A TP feed circuit breaker to the canal.

Phase 1 Power Supply

The power supply to the Area 1 Phase 2 borehole WW 28565 at Brandwacht is a Diesel generator set consisting of a 12.1 kW Lister engine and a Mecc Alte alternator with a nominal output of 8

kVA. Power from the generator board feeds the pump control panel which has a 125A TP main circuit breaker.

Phase 2 Power Supply

The power supplies to the Phase 2 boreholes are individual 11kV/400V 25 or 50 kVA pole mounted transformers which supply power at 400V to the meter board mounted below the transformer. From the meter board with a main circuit breaker of 40A or 80A TP rating, power is fed to a pump control board located near the borehole, generally mounted on a steel pole or support structure.

3.6 Maintenance

Maintenance is done by a permanent NamWater team.

3.7 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.

3.8 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.

3.9 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.

3.10 Reservoirs

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

3.11 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.

4. BRIEF DESCRIPTION OF THE RECEIVING ENVIRONMENT

The baseline description provided below focuses on the receiving environment:

4.1 Climate

Karstland area has a semi-arid climate, with hot summers and mild winters.

4.1.1 Precipitation

Due to the location near the Tropic of Capricorn the study area has a subtropical summer rainfall regime. The rainy season starts in October/November and ends in April/May; highest rainfall is observed in February (Mendelsohn *et.al*,. 2002). Karstland area experiences very low rainfall, with an annual average rainfall of 457 mm .

4.1.2 Temperature

The area receives between 150 and 250 mm of rain per annum. Potential evaporation is as high as 3 800 mm in the south-eastern part of the basin, and in normal years little or no local runoff is generated (Weismiller, *et al*., 2012).

4.2 Geology

Paragneisses and granites of the Grootfontein complex are the oldest rocks in the Karstland Boreholes area. Overlying this complex, the Precambrian Damara Sequence has been deposited in a basin between the Kongo and the Kalahari cratons. The sequence was folded and metamorphosed during the Pan African orogeny, forming the most extended type of pre-Kalahari rocks in the area. The Northern and the Central represent various depositional environments and have undergone different degrees of metamorphism. The lowest unit of the Damara Sequence is formed by the basal Nossib Group, mainly composed of quartzite, conglomerate and schist in both the Northern and the Central Zone (Külls, 2000).

A prominent feature of the region is a major outcrop of the Etjo Formation: the Waterberg. The Etjo sandstone preserved the crops out in an area south of the Waterberg Fault. Along it, folded rocks of the Damara Sequence, probably initially also overlain by Mesozoic sediments, have been thrust over a southern block (Waterberg Thrust Fault). Due to the contrasting hydraulic properties of the Etjo sandstone and the underlying Omingonde Formation, and due to the good permeability of the Etjo sandstone, it is a fresh groundwater aquifer (Külls, 2000). The occurrence of basalt in the Etjo sandstone is documented from boreholes drilled near the farms Rimini and Hairabib. Dykes have intruded rocks of the Damara Sequence north of the Waterberg.

4.3 Natural Flora

The Karstland is found within the Namibian Savanna Woodland ecoregion, an area characterized by a great variety of species, many of which are endemic. The area is typically dominated by *Euphorbia guerichiana*, *Cyphostemma* spp. with succulent stems, *Adenolobus* spp., and *Moringa ovalifolia*. Two species of Acacia are confined to this vegetation type; these are the Brandberg acacia (*Acacia montis-ustii*) and *A. robynsiana*. *Acacia senegal* and *A. tortilis* are also found in the area, mainly in the alluvial sands and silts along ephemeral rivers in the ecoregion. High diversity of the genus Commiphora is particularly characteristic of both the mopane savanna to the north and the semi-desert and savanna transition zone (Spriggs, 2017).).

4.4 Fauna

Karstland is found within the Namibian Savanna Woodland ecoregion, which is a centre of high faunal endemism and species richness. The ecoregion hosts a variety of large to small fauna, ranging from, gemsbok (*Oryx gazella*), springbok (*Antidorcas marsupialis*), Kudu (*Tragelaphus*

strepsiceros), black-faced impala (*Aepyceros melampus petersi*) and Damara dik-diks (*Madoqua kirkii*), cheetah (*Acinonyx jubatus*), leopard (*Panthera pardus*), Cape fox (Vulpes chama) and bat-eared fox (*Otocyon megalotis*). Seven reptiles are strictly endemic to the ecoregion such as Namaqua spinytail lizard (*Cordylus namaquensis*), Nama padloper (*Homopus solus*), Brandberg thick-toed gecko (*Pachydactylus gaiasensis*), Campbell's spinytail lizard (*Cordylus campbelli*), Husaben sand lizard (*Pedioplanis husabensis*), Herero girdled lizard (*Cordylus pustulatus*), and Albert's burrowing skink (*Sepsina alberti*) (Spriggs, 2017). Only two amphibians are considered endemic to the ecoregion, the Okahandja toad (*Bufo hoeschi*) and the Mossamedes toad (*B. grandisonae*). Five birds are endemic or near-endemic to this ecoregion: including the tractrac chat (*Cercomela tractrac*), the Herero chat (*Namibornis herero*), greybacked cisticola (*Cisticola subruficapillus*), and Karoo chat (*Cercomela schlegelii*) (Simmons et al., 1998).

5. THE LEGAL ENVIRONMENT

A legal review was done and the key laws of concern include those which protect the ecological integrity of the Karstland 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 Karstland 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 objects of the EMP are being obtained;
- 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 Karstland Boreholes 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 2: 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	• Establish environmentally sensitive and technically sound maintenance procedures as well as reporting structures. • Compile a staff competency assessment and training programme. • Establish emergency procedures to ensure appropriate response and minimise potential risk to the biophysical and social environment.	1. Establish regular reporting procedures on maintenance 2. Undertake regular inspection and maintenance of all infrastructure to ensure in working order and to assess damaged / deficient equipment, as per the O&M Manual. 3. Review, and if necessary, revise maintenance manual. 4. Establish emergency procedures guidelines for the blockage/failure, flooding, contaminant removal and disinfection, power failure and fire of the scheme. 5. Implement the response procedures when emergency incident occurs. 6. Complete the incident report checklist in the case of emergency and keep with monitoring records for submission. 7. Undertake annual education course for all operational staff. 8. Review, and if necessary revise emergency manual.	Bi-monthly for the lifespan of infrastructure as per the maintenance manual. Bi-annually for lifespan of works. When emergency incident occurs. Emergency incident Annually for lifespan of operation. Annually for lifespan of operation Annually for lifespan of operation

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 Karstland water pipeline. 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, anticorrosives, 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 cause 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.

<u>General Waste</u> includes waste paper, plastic, cardboard, harmless organic (e.g. Vegetables) and domestic waste

<u>Hazardous Waste</u> 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.

<u>Cultural and Historical</u> Objects include old buildings, graves or burial sites, milestones, old coins, beads, pottery and military objects.

<u>Pre-Historical objects</u> 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 point 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

11. REFERENCES

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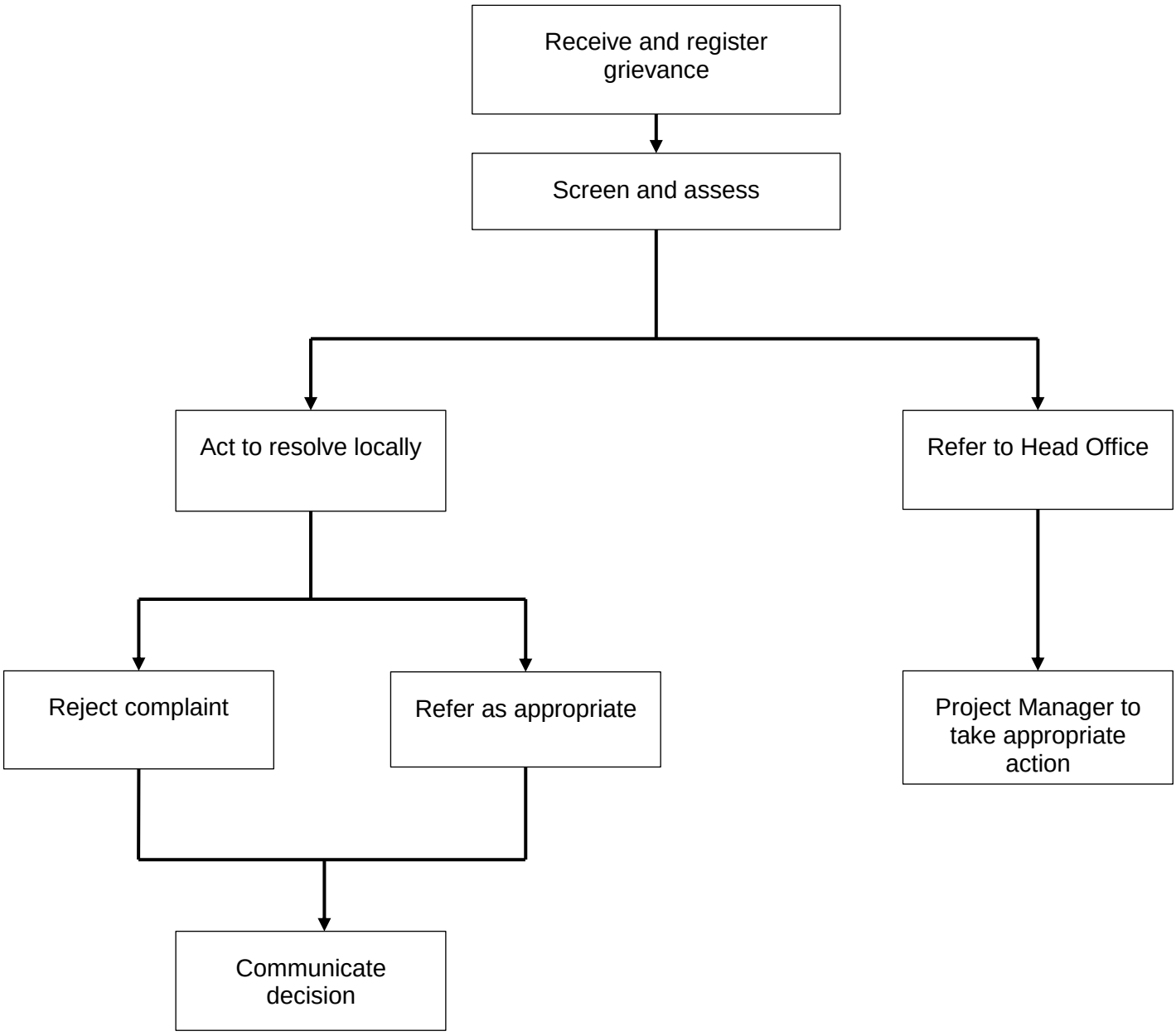
ANNEXURE 1: GRIEVANCE PROCEDURE AND REGISTRATION FORM



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:	