AIS-AIS 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
EMP	Environmental Management Plan
HIV	Human Immunodeficiency Virus
I&AP	Interested and Affected Parties
NaDEET	Namib Desert Environmental Education Trust
MEFT	Ministry of Environment, Forestry and Tourism
NNF	Namibia Nature Foundation
NEM	NamWater Environmental Manager
STI's	Sexually Transmitted Infections

1. PURPOSE OF THE EMP

This Environmental Management Plan (EMP) has been compiled for the management of potential environmental impacts during the construction, operation, and decommissioning phases of the proposed Ais-Ais Water Scheme Extension. Best practice is proposed for the generic issues of construction management and supervision as well as the on-going management and operation of the pipeline.

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, Forestry and Tourism (MEFT: DEA).

2. INTRODUCTION

Ais-Ais is located in the Karas Region, south of Namibia and sits on the Canyon of the Fish River. It can be accessed via the 30 km right turn off after Grünau on the B1 highway to Noordoewer along a 73 km C10 gravel road. The Ais-Ais Nature Resort is located in the south of Namibia, in the Ais-Ais National Park conservation area, which falls under the Ministry of Environment and Tourism and is managed by Namibia Wildlife Resorts. The resort is able to accommodate up to 500 people with approximately 50 personnel that operates the resort and reside in staff accommodation units close to the resort. The location of Ais-Ais is depicted in **Figure 1.**

NamWater is responsible for bulk water supply to Ais-Ais Hot Springs Resort. Water supply during peak periods has been failing to meet demand and forcing over-abstraction of existing boreholes.

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

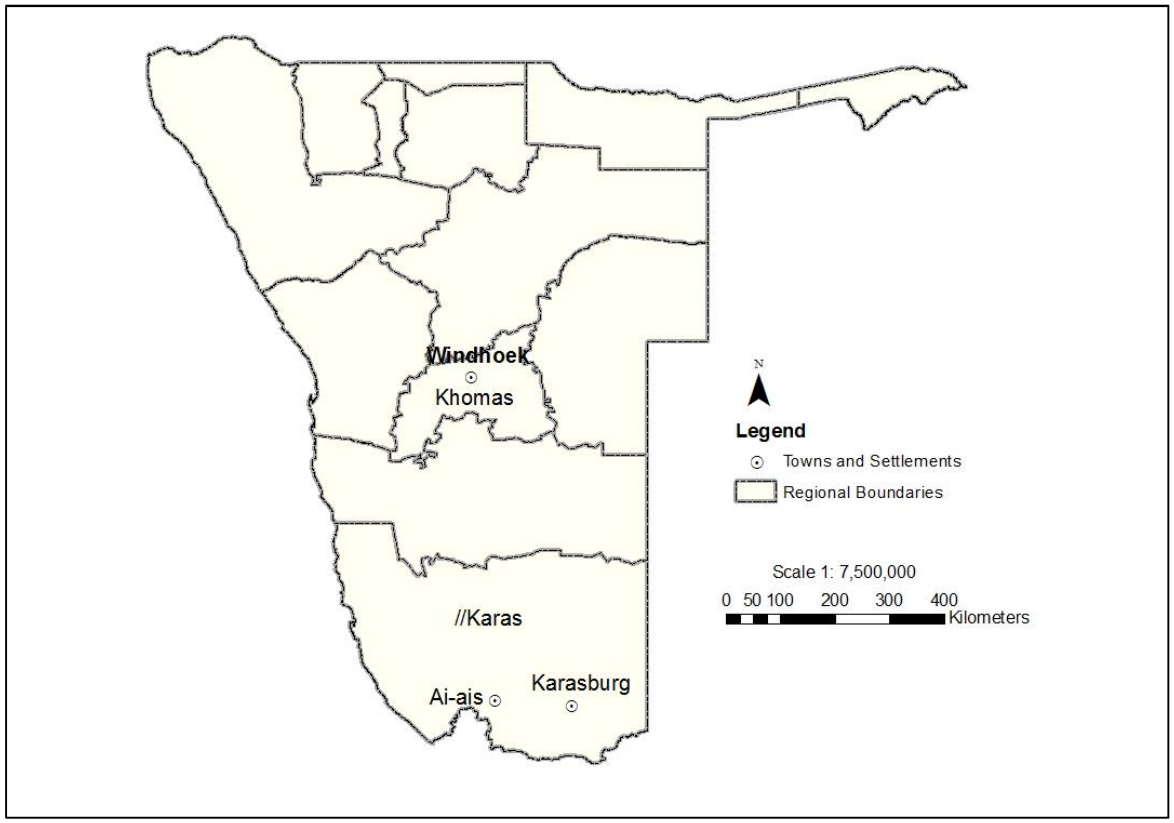

Figure 1: Location of Ais-Ais Town

3. EXISTING AIS-AIS WATER SUPPLY INFRASTRUCTURE

3.1 Water Source

The aquifer formation lies within the Fish River bed. Due to the occasional shortage in water supply at the resort during periods of peak business, as well as the evident over-utilization of the existing production boreholes, a number of options to supplement the water supply have been investigated in the past.

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

3.2 Water Quality and Disinfection

The production boreholes in the Ais-Ais Scheme provide raw water that contains parameters within Group B and/or Group C of the guidelines. Fluoride levels in water samples from boreholes were found to be unacceptable with concentrations averaging around 2.5mg/l - 3.0 mg/l in three boreholes. The water from some boreholes contains levels of Turbidity, Na, Ca as $CaCO_3$, F and SO_4 that exceed Group B of the Guidelines.

At present, chlorination takes place by means of a floating dispenser inside the terminal reservoir that has a capacity to chlorinate 200 m^3 of water per day.

3.3 Pipe Work

The bulk water pipeline to Ais-Ais can be divided into three sections. The first section consists of 32 mm High density polyethylene (HDPE) class 10 pipelines of varying length from each borehole in the river bed to the collector Gas Manifold Systems (GMS) manifold pipeline with a 65 mm diameter. Each of the 32 mm pipeline has a 25 mm water meter before discharging into the manifold. This collector manifold reduces to 50 mm water meter. After the 50 mm water meter, the pipeline enlarges into an 80 mm GMS pipeline for about 50 m.

The second section consists of HDPE pipelines that replaced, through repair work, the original, 80 mm GMS pipeline section that was corroded. About 200 m length of the 110 mm HDPE pipeline is connected from the 80 mm pipeline. The 110 mm pipeline is reduced to a 63 mm HDPE of length 1 300 m.

The last 1.5 km section of the bulk water pumping pipeline consists of a 65 mm GMS pipeline. The end of this pipeline discharges onto the 280m^3 ground concrete storage reservoir located about 100 m from the top of the mountain.

3.4 Reservoir

There is a 280 m^3 concrete reservoir on the top of the mountain overlooking the lodges. The reservoir inlet and outlet is made of 100 mm GMS pipes. The outlet is reduced in the meter room to 50 mm GMS pipeline. Two 50 mm water meters in series are installed before the pipeline enlarges into a 100 mm GMS pipeline belonging to the Namibia Wildlife Resort (NWR).

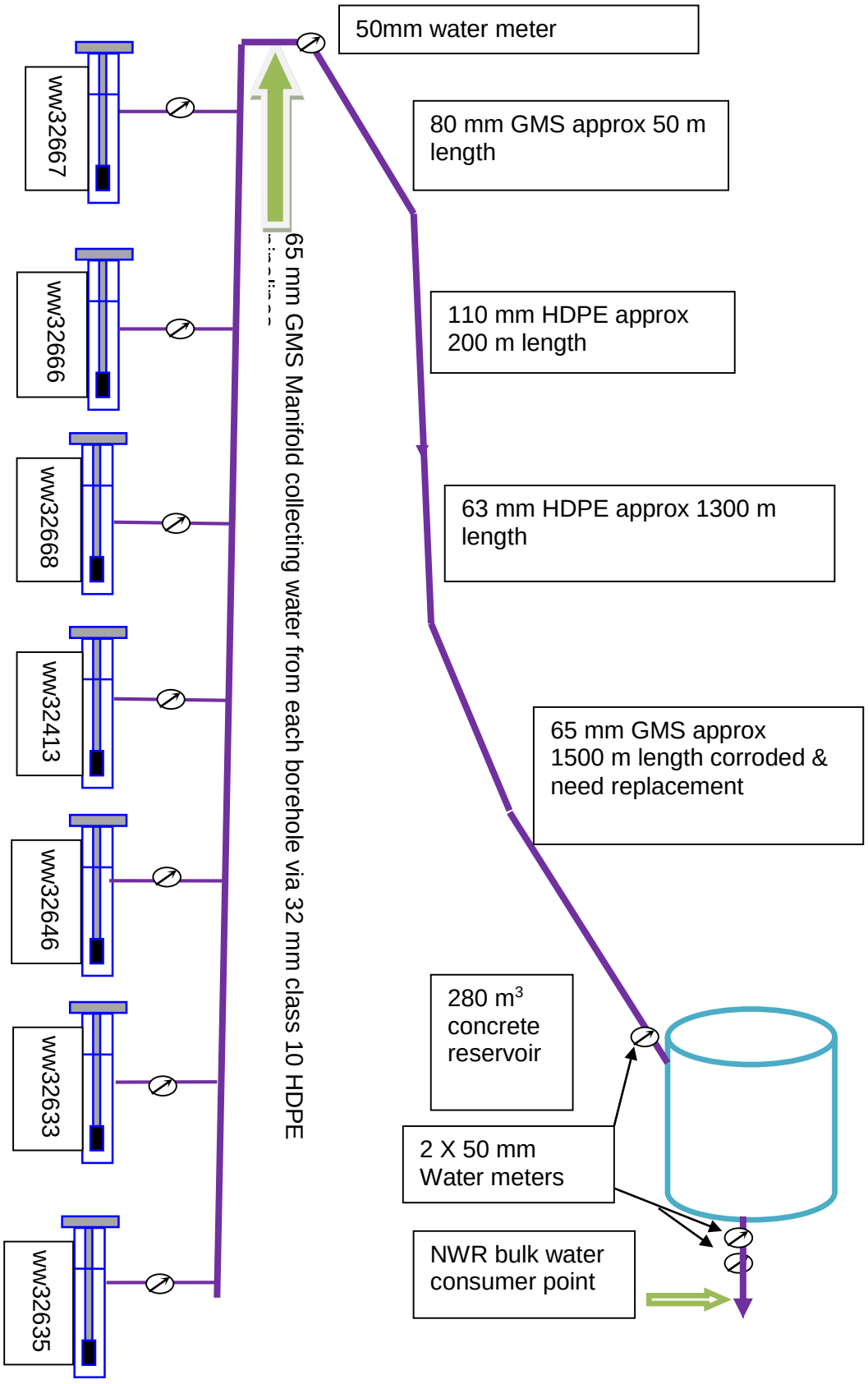

Figure 2: Ais-Ais Scheme Schematic Layout

3.5 Power Supply and Control System

A 500 Kilovolt-ampere (KVA) transformer supplies electric power to the whole of Ais-Ais Resort except for the workers' quarters section that has a separate transformer. The 380 Volts (V) power supply to the boreholes is by means of a 3.5 km, 16 mm^2 electrical cable between the reservoir and boreholes. The existing 3.5 km 16 mm^2 armoured cable is inadequate to supply power for the seven boreholes when they are all on duty.

Borehole pump control is by means of a float valve in the terminal reservoir. By opening or closing of the float valve, it disconnects or connects the power supply to the boreholes and switches all of them off or on simultaneously.

3.6 Maintenance

Maintenance is done by a permanent operator on site.

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

Monthly the valves must be opened 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

Monthly the gauge cocks must be turned 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.

4. RESPONSIBLE PARTIES

NamWater's Environmental Manager is primarily responsible for the implementation of the EMP during all the operation and maintenance of the scheme.

4.1 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 Environmental 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.

5. 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 Environmental Management Plan (EMP) is to ensure that the project complies with the goals of the Namibian Environmental Management Act (No. 7 of 2007. Best practice is proposed for the operation and maintenance 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 Environmental Management Plan (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.

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

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

The scheme supervisor is responsible for regular monitoring of the EMP compliance while NamWater Environmental Section will be responsible for annual compliance monitoring.

6. BRIEF DESCRIPTION OF THE RECEIVING ENVIRONMENT

Ais-Ais has a semi-arid climate, hot summers and mild winters *(*Mendelsohn *et al.,* 2002*)*

6.1 Climate

The Ais-Ais area has a typical semi-desert climate, with temperatures soaring during the day in summer and very low temperatures in winter.

6.1.1 Precipitation

Ais-Ais experience extremely low rainfall with average annual rainfall ranging between 100 and 200 mm. Most rain occurs during the months of February and March. Rainfall is highly variable and unpredictable, as the area falls within the climatic transition zone between winter and summer rainfall. The little rain that does fall can occur at any time of the year, though there is a tendency for the late summer months to receive slightly higher rainfall than other months. The area experiences a water deficit (rainfall minus evaporation) of over 3 metre per year (NaDEET and NNF, 2010; NamWater, 2011).

6.1.2 Temperature

During the hot summer months (October - March) temperatures can rise up to 48°C during the day and cools down to about 30°C at night. A relief from the summer heat comes in short precipitation spells with occasional thunder storms. During the short winters, temperatures can go down below zero at night, but quickly picks up during the day to a moderate 20-28°C (NaDEET and NNF, 2010).

6.2 Geology

The Ais-Ais area lies within a horizontal dolomite strata. These strata are part of the Fish River Canyon which formed about 650 million years ago when plate movement cracked the earth, the first process in the formation of the canyon (NamWater, 2011).

A granite complex surrounding the area forms a characteristic river bed that results in forms like finger-lakes. In this area, a fault runs north-south, which accounts for the gorge-like channel and the presence of hot sulphurous springs (NamWater, 2011).

6.3 Natural Vegetation/Flora

The cold and frost in winter and high temperatures in summer demand special adaptations from plants (NaDEET and NNF, 2010). All plants are well adapted to the semi-desert environment and can survive severe droughts of up to 5 years. The *Aloe dichotoma* or Quiver Tree (Namibia's national tree) is mostly found in the south of the country. There are beautiful examples of these around the Ais-Ais area. The trees can reach an age of about 300 years, and flowering occurs during winter time from May to July. Other plants include the three thorns Rhigozum (*Rhigozum trichotomum*), various grass species and species of succulents, such as the very poisonous *Euphorbia tirucalli* (Milk-bush).

6.4 Fauna

The Ais-Ais area has been reported to be home to various avifauna such as the Black Eagles (*Ictinaetus malayensis*), Fish Eagles (*Haliaeetus vocifer*), Kingfishers; Giant Kingfisher (*Megaceryle maxima*) and the African Pigmy Kingfisher (*Ispidina picta*), Lovebirds (*Agapornis roseicollis*), Ostrich (*Struthio camelus australis*) and various species of waterfowl and wading birds, such as Herons (*Ardea melanocephala*)(Callan et al., 2006).

The Nama Padloper Tortoise (*Homopus solus*) protects itself by hiding in the rocks and crevices around the Ais-Ais area. Reptiles and insects are in abundance with species like the Nile monitor lizards (*Varanus niloticus*), and the Karoo girdled lizard (*Cordylus polyzonus*). Various species of snakes are commonly observed around the Ais-Ais area, such as the Cape cobra (*Naja nivea*), black spitting cobra (*Naja nigricollis*), beetz's tiger snake (*Telescopus beetzi*), puff adder (*Bitis arietans*) and horned adder (*Bitis cornuta*).

There are several species of mammals that can be encountered around the Ais-Ais area, such as the Hartmann zebra (*Equus zebra hartmannae*), kudu (*Tragelaphus strepsiceros*), klipspringer (*Oreotragus oreotragus*), leopard (*Panthera pardus*), steenbok (*Raphicerus campestris*), baboon *(Papio ursinus*) and springbok (*Antidorcas marsupialis*). The most common rodents include mice (*Acomys spinosissimus*), rats (*Otomys irroratus*), rock hyrax (*Procavia capensis*) and dassie rats (*Petromus typicus*).

7. CONSTRUCTION PHASE MANAGEMENT ACTIONS

7.1 Planning and Design

The Design Engineers must take cognisance of the outcomes and recommendations of the EMP. The Engineer must ensure that this EMP is included in the briefing documentation to the Scheme Supervisor (to be appointed). The Engineer must advise the Scheme Supervisor to familiarise himself with the EMP and ensure that adequate resources are made available to implement the requirements of the EMP.

7.2 Environmental Awareness

7.2.1 Environmental, health and safety induction course

The Scheme Supervisor is responsible for informing employees of their environmental obligations in terms of the EMP and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts.

The Scheme Supervisor shall ensure that all his employees, attend an Environmental, Health and Safety Induction Course. This course shall be structured to ensure that attendees:

- Acquire a basic understanding of the key environmental features on the site and its immediate environs;
- Become familiar with the environmental controls contained in the EMP;
- Are made aware of all protected areas and that the trapping, poisoning, and/ or shooting of animals is strictly forbidden. No domestic pets are allowed on site;
- Are made aware of the need to conserve water and minimise waste;
- Receive pertinent, written instructions regarding compliance with the relevant environmental management requirements (viz. typical environmental “do’s” and “don’ts”);
- Are made aware of any other environmental matters as deemed necessary by the Engineer/ Environmental Control Officer (ECO);
- Are made aware of the importance of preserving archaeological sites;
- Receive detailed training in site health and safety requirements, emergency responses and site evacuation procedures in terms of the Scheme Supervisor’s health and safety plan;
- Are made aware of NamWater’s Code of Conduct;
- Are aware that a copy of the EMP is readily available on site and that all site 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.

The Environmental, Health, and Safety Induction Course should be conducted by the ECO and Scheme Supervisor’s Health and Safety officer, who shall provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented. All new staff coming onto site after the commencement of construction activities must also attend the Environmental, Health and Safety Induction Course, and refresher courses should be undertaken on a quarterly basis. A detailed record of all training sessions, including a list of attendees must be compiled by the Scheme Supervisor and submitted to the Project Manager on a regular basis.

The initial Environmental, Health, and Safety Induction Course shall be held within 14 days from the site mobilisation date, and subsequent courses shall be arranged for all new employees arriving after the initial training course, also within 14 days of their arrival.

The Scheme Supervisor shall provide a suitable venue with necessary facilities and ensure that all employees attend the environmental, health and safety induction course. The course shall be held in the morning during normal working hours. No more than 30 people shall attend each course and the Scheme Supervisor shall allow for sufficient sessions to train all personnel. The Scheme Supervisor shall provide proof of attendance by all of his employees in the form of a signed attendance register.

7.2.2 Toolbox talks

Environmental, health and safety issues specific to each area of the works, shall form part of the daily toolbox talks in each area. These can be short 10 – 15 minute discussions on the environmental sensitivities of the general area and/ or the specific sections that would be worked on, on that day. The foreman responsible will provide feedback to his staff on their day-to-day environmental performance and address issues requiring attention and specific actions required. A synopsis of the topics discussed at each area shall be recorded on a register and submitted to the ECO on regular (typically weekly) basis. Environmental matters shall be dealt with in toolbox talks on a regular basis (typically at least once a week).

7.2.3 Safety of the public

The Scheme Supervisor shall take all reasonable measures to ensure the safety of people in the surrounding area. Where the public could be exposed to danger by any of the Works or site activities, the Scheme Supervisor shall provide flagmen, barriers, and/ or warning signs in English, all to the approval of the Engineer/ ECO.

All unattended open excavations shall be adequately demarcated (fencing shall consist of orange mesh). Adequate protective measures must be implemented to prevent unauthorised access to the Working Area. No firearms shall be permitted on site.

The Scheme Supervisor shall implement appropriate measures to limit any adverse social impacts associated with the accommodation of a construction workforce on the local communities. The following mitigation and management measures are prescribed in this regard:

- Measures to combat HIV/ AIDS and other social ills:
    - NamWater should ensure the health of its employees and their dependants by adopting rigorous health programmes, which should, at a minimum, include programmes to combat HIV/ AIDS and tuberculosis (TB);
    - The Scheme Supervisor should provide an adequate supply of free condoms to all workers;
    - A voluntary counselling and testing programme should be introduced during the construction phase and continued during operations; and
    - Access at the construction site and camp should be controlled to prevent sex workers from either visiting and/ or loitering at or near these locations.

- Measures to prevent crime:
    - Construction workers shall be clearly identifiable by wearing proper construction uniforms displaying the logo of the construction company. Construction workers could also be issued with identification tags in order to gain access to the construction site;
    - All construction workers shall at all times wear the required Personal Protective Equipment (PPE); and

- The Scheme Supervisor should establish clear rules and regulations for access to the construction site and offices to control loitering. Consultation should occur with the local Namibian police branch to establish standard operating procedures for the control and/ or removal of loiterers.

- Measures to reduce traffic related incidents:
  - Ensure that road junctions have good sightlines;
  - Transport the materials in the least amount of trips as possible, whilst being careful of overloading vehicles;
  - Limit speed both on and off the site;
  - Adhere to the speed limit; and
  - Implement traffic control measures where necessary.

7.2.4 Working times

The Scheme Supervisor shall restrict construction activities to the hours of 06h30 - 17h00 during on Mondays to Saturdays and no work will be permitted on Sundays or public holidays.

8. OPERATION PHASE MANAGEMENT ACTIONS

8.1 Introduction

The Operational Phase Section of the Environmental Management Programme 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.

The information is summarised in tabular format illustrating the activity, aspect, impact, mitigation measure, performance indicators, resources, schedule and verification. These criteria are listed and explained below:

The following components are identified/ described:

- **Activity**: component/ activity of the project for which the impact has been identified;
- **Aspect**: the aspect of the above activity which will be impacted;
- **Impact**: the environmental impact identified and to be mitigated;
- **Mitigation measure**: measures identified for implementation in terms of environmental management to reduce, rectify or contain the identified environmental impact – mitigation is divided into the following:
    - **Objective**: desired outcome of mitigation measure,
    - **Mechanism**: method of achieving the objective;
- **Performance indicators**: outcomes that will indicate achievement of objective/s;
- **Responsibility**: party or parties identified for implementation of mitigation measure/s;
- **Resources**: available resources to aid implementation of mitigation;
- **Schedule**: timeframe in which identified impact and mitigation measure is anticipated to occur; and
- **Verification**: party or parties identified as responsible for review and assessment of final outcome.

Table2: Operation 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. Develop an Operation and Maintenance (O&M) manual of procedures with technical guidelines (section 3.2). 2. Establish regular reporting procedures on maintenance (section 3.2). 3. 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. 4. Review, and if necessary, revise maintenance manual. 5. Establish emergency procedures guidelines for pipe and pump station blockage / failure, flooding, contaminant removal and disinfection, power failure and fire. 6. Implement the response procedures when emergency incident occurs. 7. Complete the incident report checklist in the case of emergency and keep with monitoring records for submission. 8. Undertake annual education course for all operational staff. 9. Review, and if necessary revise emergency manual.	Within the first year of operation. Within the first year of operation. Once a week for lifespan of infrastructure as per the O&M 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 the pipeline and pump station are important in protecting the environment and ensuring that resources are not wasted and environmental incidents arising out of equipment or infrastructure failures, are avoided. A detailed Operation and Maintenance (O&M) Manual will be compiled for the Ais-Ais Water Treatment Works (WTW) by a qualified person for the project, should one not already exist for the existing works. The O&M Manual will be implemented once the operational phase of the new pipeline commences. The manual will provide detailed guidance on the operation of all machinery and associated systems as well as related maintenance procedures, including maintenance schedules. Implementation of this manual by NamWater will facilitate the proactive management of potential risks and thus result in impacts on the receiving environment being averted. Accordingly, the O&M Manual shall be regarded as an integral component of the OEMP.

The Ais-Ais WTW O&M Manual will include, but not be limited to, the following sections:

- Works Safety including personnel safety and equipment safety;
- Equipment summary;
- Works description;
- Works operation, including:
    - Commissioning start up (Pre-start-up checks), and
    - Normal operation (Operation and daily operation checks).
- Maintenance schedules, including
    - General care and maintenance,
    - Maintenance log,
    - Daily operating checks,
    - Monthly Maintenance Procedures, and
    - Annual Maintenance Procedures.

The maintenance procedures set out in the O&M Manual, will provide specific guidance in terms of the monitoring and maintenance of the key mechanical and electrical equipment. 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. Completed schedules will be kept on site to provide a complete compliance record.

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 pipe damage 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 from 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 project is vital to the overall success of any environmental management plan. It is therefore recommended that a general environmental awareness course for all new operational staff and employees of maintenance Scheme Supervisors, who may be required to carry out duties on the project, be undertaken on their appointment. It is

recommended that the regional council create a “green rules” pamphlet for dissemination to all workers and Scheme Supervisors working on all council projects and sites.

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:

- A waste management programme.
- 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 MSDS whenever using such materials. NamWater 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 developers as a whole.

A big positive of the project is that the new reservoir will increase the storage capacity for Mariental water supply to at least 48 hours. Short term water supply interruptions should not occur after completion, filling and operation of the proposed new reservoir.

Construction will have temporary effects on several areas and these will require rehabilitation. Impacts may be short in duration (lay down areas) and rehabilitation could occur immediately after the impact ends; or permanent (construction of the reservoir) and rehabilitation is impossible. However, rehabilitation management is an ongoing process which should continue, if necessary, for long after completion of the construction project.

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 after completion of the project to determine if the necessary rehabilitation work was done. Rehabilitation will be done to the satisfaction of NamWater and MEFT.

b. Rehabilitation work should be done as soon as construction work is completed.

c. All excess construction material should be removed from construction sites.

d. All newly established roads no longer required must be rehabilitated. Tracks can be rehabilitated by raking the area or dragging tyres or branches (or other suitable material) behind a vehicle. Make sure that the central ridge in the road is removed. Remove all windrows.

e. Remove all waste, rock stockpiles, construction equipment, surplus materials and temporary structures, fences and demarcation material established by the Scheme Supervisor.

f. Breaks up all bunds, concrete slabs and remove these with all waste concrete to an appropriate waste dump.

g. Make sure all polluted soil is stored in drums and removed to an appropriate waste dump.

h. Make sure all windblown litter is removed.

i. Make sure that all potential hazards (i.e. the sewerage pit) are properly closed and left in a safe and neat position.

j. Newly established borrow pits should be neatly worked off. Rehabilitation will include at least slope reduction and levelling. The maximum acceptable slope in the rehabilitation of a pit is a ratio of one vertical to three horizontal (33 percent grade).

k. Repair all fences and gates if damaged by the Scheme Supervisor.

l. All rehabilitated areas shall be considered “no go” areas and the Scheme Supervisor shall ensure that none of his staff or equipment enters these areas.

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 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 Kamburona
Tell: 061-71 2105
Cell: 081 144 1528

11. REFERENCES

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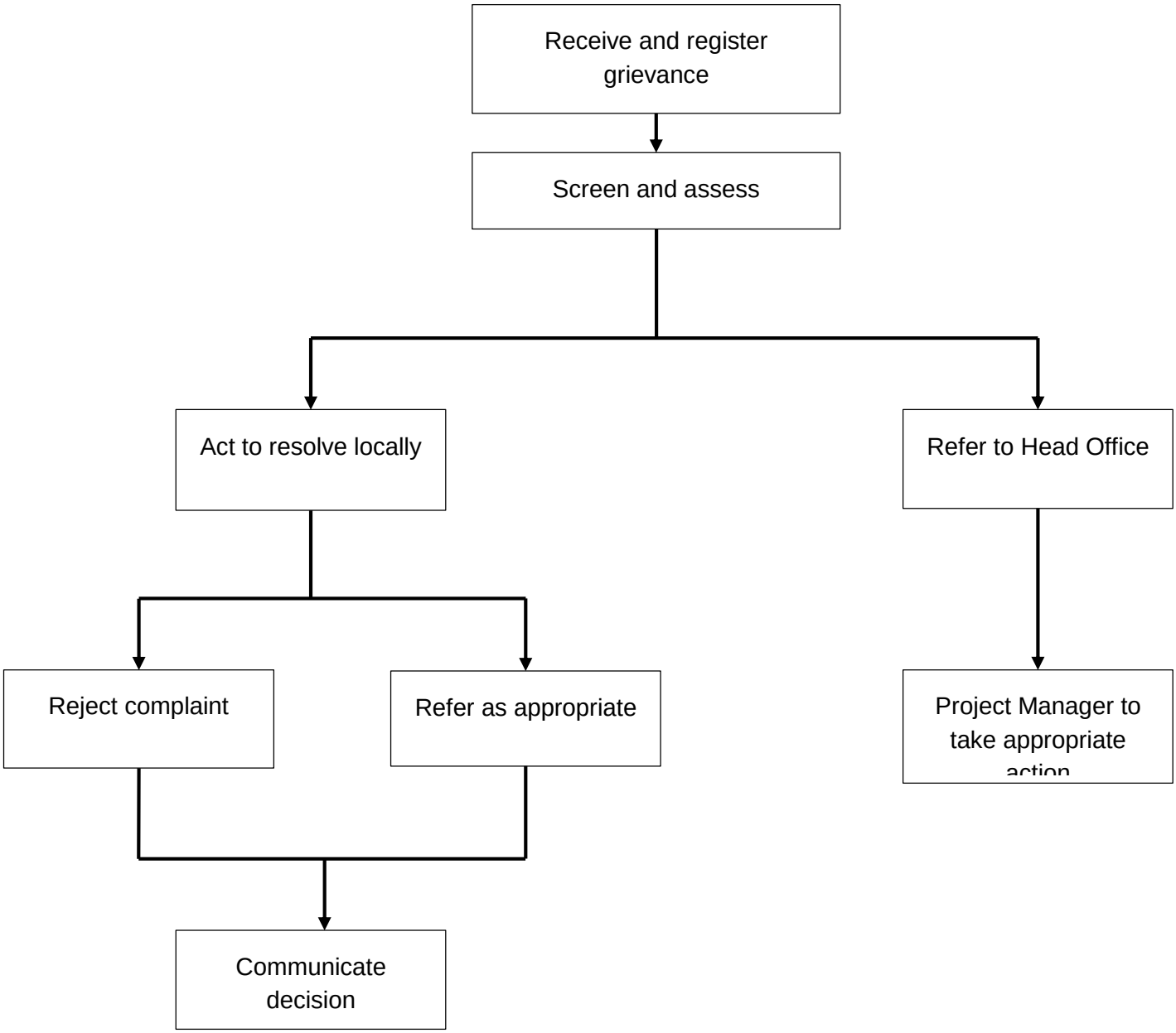
ANNEXURE 1: GRIEVANCE PROCEDURE AND REGISTRATION FORM



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:	