

**KUISEB DELTA WATER SUPPLY SCHEME**

**ENVIRONMENTAL MANAGEMENT PLAN**

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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 Kuiseb Delta 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).

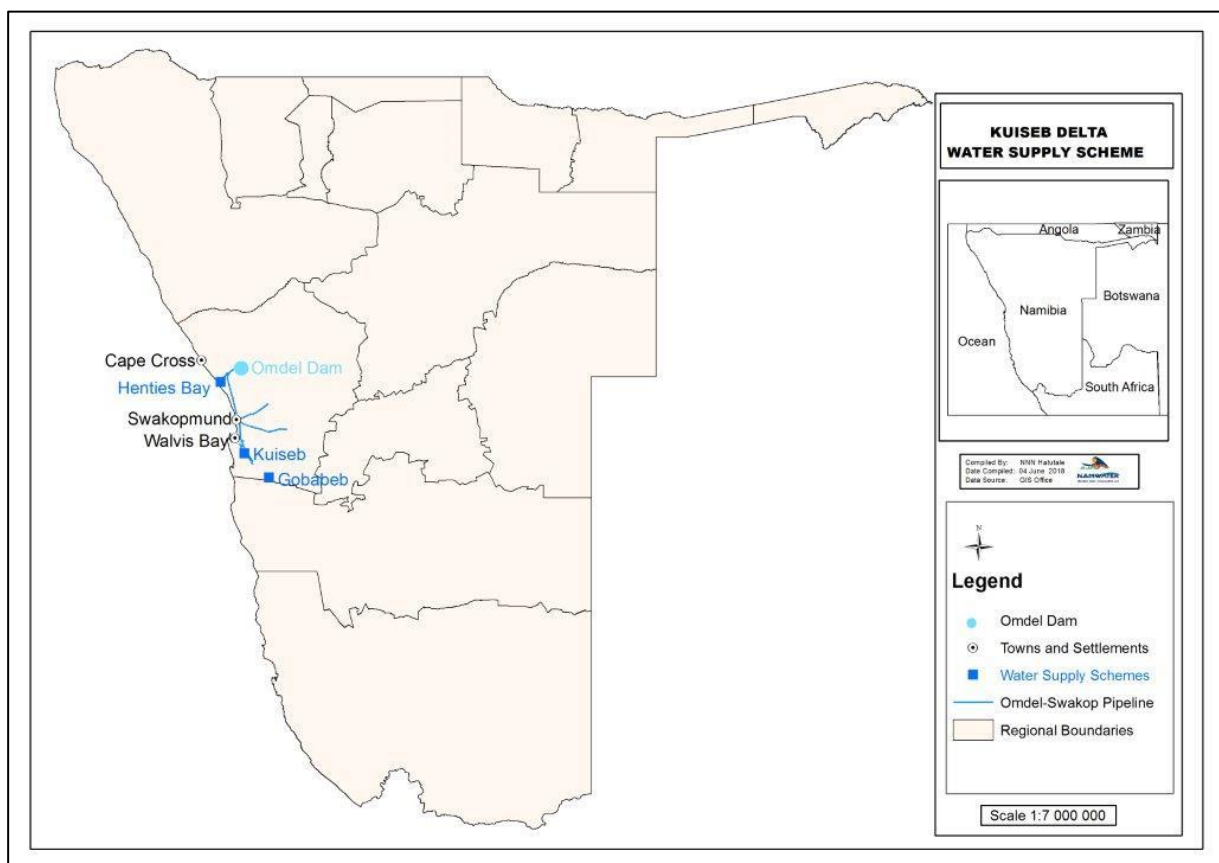
An Environmental Clearance Certificate (ECC) was originally issued in 2017 and this EMP serves as an application for the renewal of the ECC.

## 2. INTRODUCTION

The Kuiseb Delta Water Supply Scheme is situated to the south of Walvis Bay. The Kuiseb Delta Water Supply Scheme consists of the Lower Kuiseb Aquifers and all bulk water infrastructures up to and including the Mile 7 reservoirs near Walvis Bay and the terminal reservoir at Swakopmund. A locality map of the scheme is given in **Figure 1** below.

For ease of description the scheme, the Kuiseb Delta Water Supply Scheme has been divided into 3 sub-components that feed Walvis Bay and/or Swakopmund, namely Swartbank–Swakopmund, Rooibank A–Mile 7 and High Dune–Mile 7. This bulk water supply scheme consists of the Omdel Dam, the Omdel Aquifer with its boreholes, two collector pipelines bringing water from the boreholes to the

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



**Figure 1: Kuiseb Delta Water Supply Scheme Location Map**

### 3. EXISTING KUISEB DELTA WATER SUPPLY INFRASTRUCTURE

#### 3.1 Water Source

##### 3.1.1 Lower Kuiseb Aquifer

The Lower Kuiseb Aquifer currently comprises of the Swartbank, Rooibank A, Rooibank B and Dorop South aquifer compartments. In these compartments 57 production boreholes are located, scattered over a distance of approximately 30 km from the Kuiseb Delta at Dorop to Swartbank further south-east.

Using a computer model, in 2001 the sustainable yield of the Kuiseb Aquifer was calculated as 7.0 Mm<sup>3</sup>/a by the Geohydrology sub-division of NamWater (Ref. 4). A breakdown for each of the aquifer compartments is given in Table 5 below.

##### 3.1.2 Production Boreholes

The 57 production boreholes are divided into 5 production areas namely Swartbank 1, Swartbank 2, Rooibank A, Rooibank B and Dorop South, these compartments 57 production boreholes are located, scattered over a distance of approximately 30 km from the Kuiseb Delta at Dorop to Swartbank further south-east.

The schematic layouts of all the existing infrastructure is indicated in **Figure 2-9** below.

##### 3.1.3 Swartbank–Swakopmund Component

A diagrammatic layout of this component is given below in **Figure 3**. The different elements of this scheme component are detailed below.

##### 3.1.4 Swartbank Collector 2 Boreholes

This system consists of 6 boreholes with a safe yield of 140 m<sup>3</sup>/h. The layout is given in **Figure 4** below.

##### 3.1.5 Collector 2–Collector 1

This system consists of the connecting pipeline between Collector 2 and Collector 1 as well as the 17 boreholes, with a safe yield of 457 m<sup>3</sup>/h feeding into Collector 1. See **Figure 5** below.

##### 3.1.6 Collector 1 to Schwarzekuppe

This system consists of the connecting pipeline between Collector 1 and Schwarzekuppe Reservoir. See **Figure 6** below.

##### 3.1.7 Schwarzekuppe–Swakopmund

From Schwarzekuppe Reservoir the water gravitates to Swakopmund via an AC and pre-stressed concrete pipeline with off-takes to Quarry Reservoir and Rooikop Reservoir. See **Figure 7** for a layout of this section.

##### 3.1.8 Rooibank–Mile 7 Component

The Rooibank Mile has ten production boreholes with a safe yield of 200 m<sup>3</sup>/h supply the Rooibank 1 Reservoir. The boreholes only pump into Rooibank 2 Reservoir when Rooibank 1 Reservoir is out of operation. In this case, due to the higher inlet level, the supply capacity of the boreholes is reduced. The layout is given in **Figure 8** below.

### **3.1.9 High Dune–Mile 7 Component**

This component of the Kuiseb Scheme includes the Rooibank B and Dorop South well fields, the Dorop South well field has 12 production boreholes with a capacity of 3 360 m<sup>3</sup>/day or 168 m<sup>3</sup>/h, which pump water to the High Dune Reservoir from where it gravitates to the Mile 7 reservoirs. Rooibank B Groups 1 and 2 have 6 production boreholes with a capacity of 3 000 m<sup>3</sup>/day or 150 m<sup>3</sup>/h which also pump to High Dune Reservoir.

Rooibank B Group 3 has 6 production boreholes with a capacity of 2 460 m<sup>3</sup>/day or 123 m<sup>3</sup>/h which pump into the gravity pipeline connecting the High Dune and Mile 7 reservoirs. See schematic layout below.

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

The quality of water supplied to Kuiseb was evaluated for compliance with the Namibian Water Quality Standard (NWQS) and the Namibian Water Quality Guideline (NWQG). The water complied with the NWQS and the NWQG water standards and the water can be classified as Class A: Suitable for human consumption.

### **3.3 Pipe Work**

#### **3.3.1 Swartbank Collector 2**

Boreholes pipeline has eight connecting pipes with a total length of 10137 m and increases and decreases in diameter over the distance from 150 NB to 500 NB. The pipeline is classified as AC class 18 and Class 12.

#### **3.3.2 Collector 2–Collector 1**

Section starts with 250 diameter that increases and decreases along the 10941 m pipeline. The pipeline is made out of AC material, the AC class is 18.

#### **3.3.3 Collector 1 to Schwarzekuppe**

Pipeline consists of a 900NB lock joint class A section and a 800NB lock joint class A section. The pipeline capacity is calculated as 2 800 m<sup>3</sup>/h.the total length of the pipeline is 13.07 KM.

#### **3.3.4 Schwarzekuppe-Swakopmund**

The pipeline from Schwarzekuppe to the off-take to Quarry Reservoir is a 7.97 km long, 800NB fibre cement class 18 pipeline. The pipeline from the off-take for Quarry Reservoir to the off-take for Rooikop Reservoir is 7.86 km long and consists of 800NB fibre cement class 18, lock joint class A and lock joint class B pipes. The pipeline between the Rooikop Reservoir off-take and Swakopmund Reservoir is 38.84 km long and consists of 600NB, 700NB and 800NB lock joint pipes. The pipeline from the off-take on the Schwarzekuppe-Swakopmund line to Quarry Reservoir is a 2.172 km long 400NB fibre cement pipeline with a calculated capacity of 970 m<sup>3</sup>/h.

#### **3.3.5 Rooibank–Mile 7**

The component the connecting pipeline consists of a 2.718 km long, 450NB fibre cement section and a 10.509 km long, 375NB fibre cement section. The pipeline capacity is estimated as 400 m<sup>3</sup>/h. From Quarry Reservoir the water gravitates to the Mile 7 reservoirs. The 350NB fibre cement pipeline is 5.537 km long. The pipeline capacity is approximately 680 m<sup>3</sup>/h.

### **3.4 Reservoirs**

#### **3.4.1 Collector 1 to Schwarzekuppe Reservoir**

The collector 1 Schwarzekuppe Base Reservoir is a 15 000 m<sup>3</sup> round concrete reservoir with a full supply level of 159 m above sea level.



### **3.4.2 Schwarzekuppe–Swakopmund**

The Swakopmund Reservoir is a 20 000 m<sup>3</sup> is a round concrete reservoir (72 x 50 x 5.55 m) with a full supply level of 61.9 m above sea level. The Rooikop Reservoir is a round concrete reservoir with a full supply level of 114 m above sea level (asl) and a capacity of 1 000 m<sup>3</sup>.

### **3.4.3 Rooibank–Mile 7 Reservoir**

The Rooibank 1 Reservoir is a round concrete reservoir with a capacity of 2 000 m<sup>3</sup> and a full supply level of 132.62 m asl. The Quarry Reservoir has a total capacity of 15 000 m<sup>3</sup>, but due to structural damage; it can only be used up to 60% of its total capacity. The full supply level of the reservoir is 89.7 m asl.

### **3.4.4 High Dune – Mile 7 component**

The High Dune Reservoir is a 2 000m<sup>3</sup> concrete reservoir with a full supply level of 132.62 m asl.

## **3.5 Power Supply and Control System**

The power line from the Ruby substation to Rooibank and from Mile 7 to High Dune, Dorop South and Area B is the property of NamWater.

The power line from Ruby up to Rooibank includes the power supply to Schwarzekuppe Reservoir and the cathodic protection system on the Collector 1 – Schwarzekuppe pipeline. The bulk power supply infrastructure from Rooibank to Swartbank belongs to NamWater. There's an underground power line between Mile 7 and High Dune reservoir

The bulk power supply infrastructure of the scheme presently belongs to NamWater.

## **3.6 Scheme Processes/Operation**

There is a fulltime NamWater scheme operator, who does checks on a daily basis whether all the systems are functional. The scheme has been electrified and automated with timer switches.

## **3.7 Maintenance**

Maintenance is done by a permanent NamWater team.

### **3.7.1 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.

### **3.7.2 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.

### **3.7.3 Pressure Gauges and Transducers**

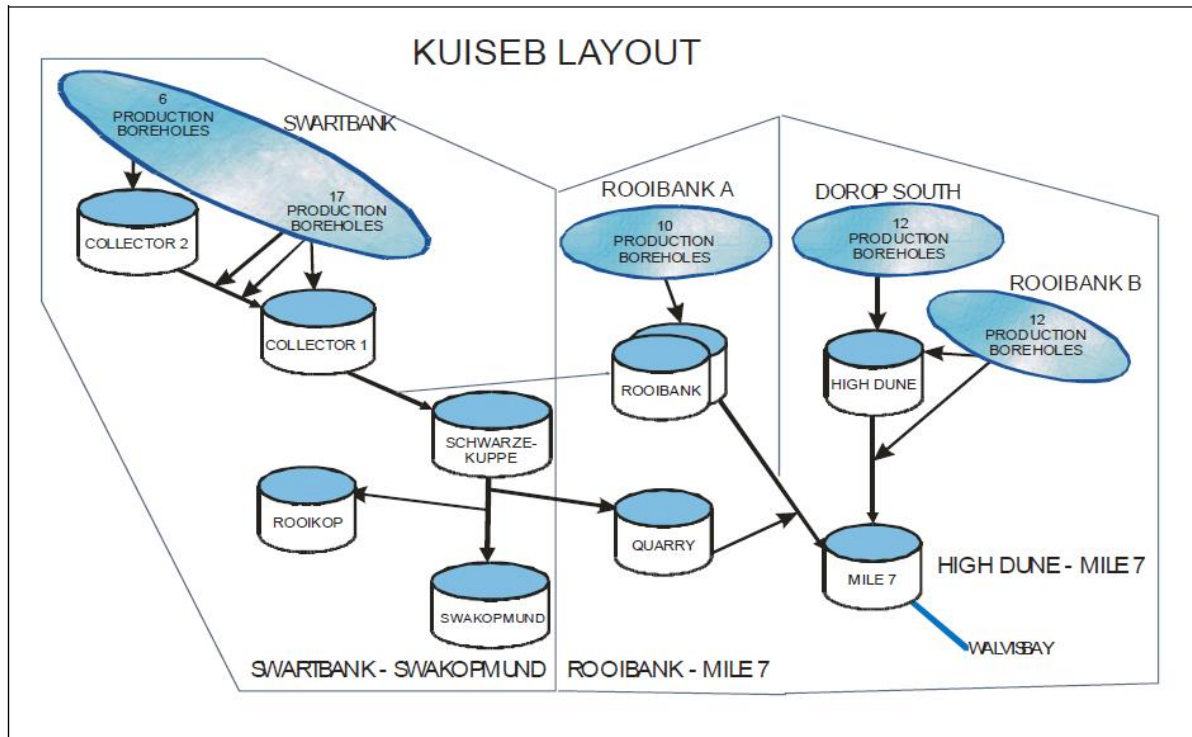
The gauge cocks must be turned monthly to bleed-off air and ensure accurate readings. Turning prevents scale accumulation which prevents the gauge cock from functioning. The operational or service intervals will depend on the severity of the conditions.

### 3.7.4 Reservoirs

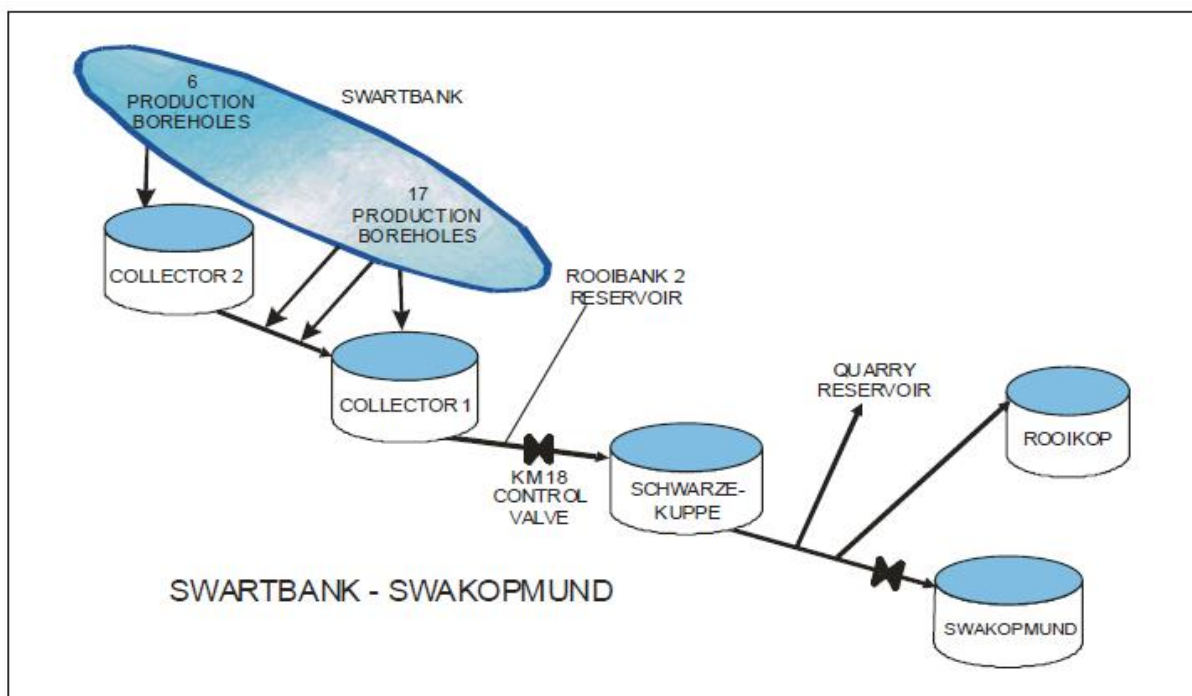
The reservoirs should be checked for leaks and other damages on a monthly basis. If leaks are detected, it should be fixed immediately.

### 3.7.5 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 Schematic Layout of Kuiseb Delta Water Supply Scheme**



**Figure 3: Schematic Layout of the Swartbank – Swakopmund Component**

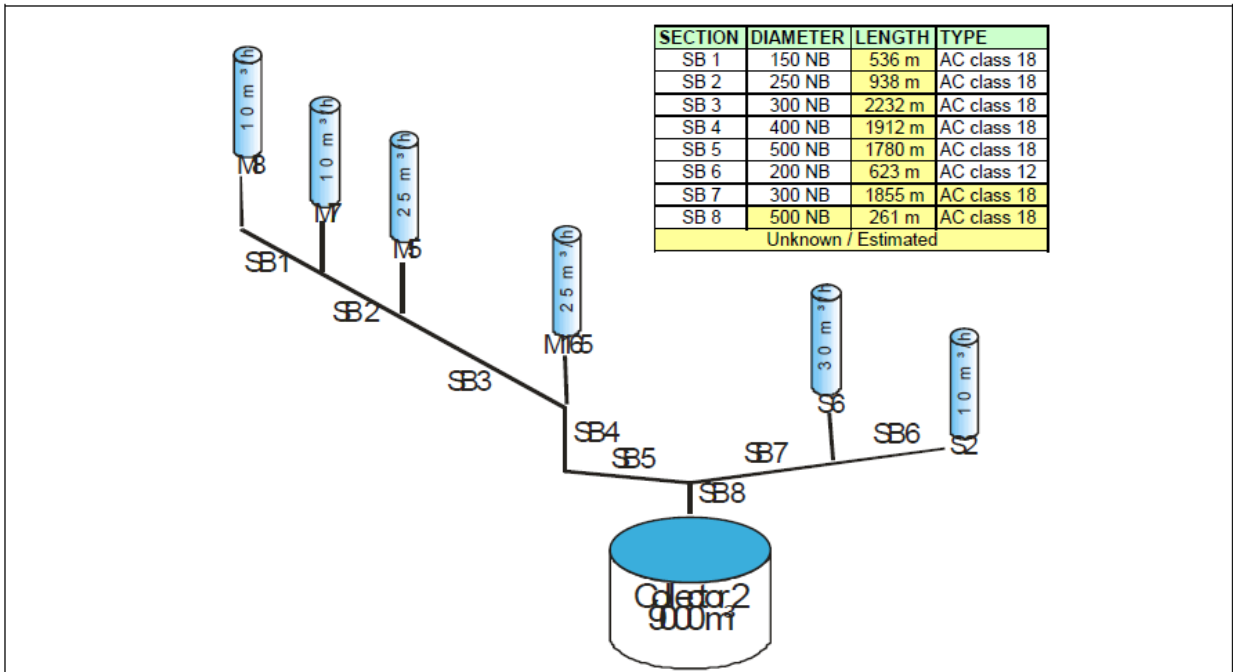


Figure 4: Schematic Layout of Swartbank Collector 2 Boreholes

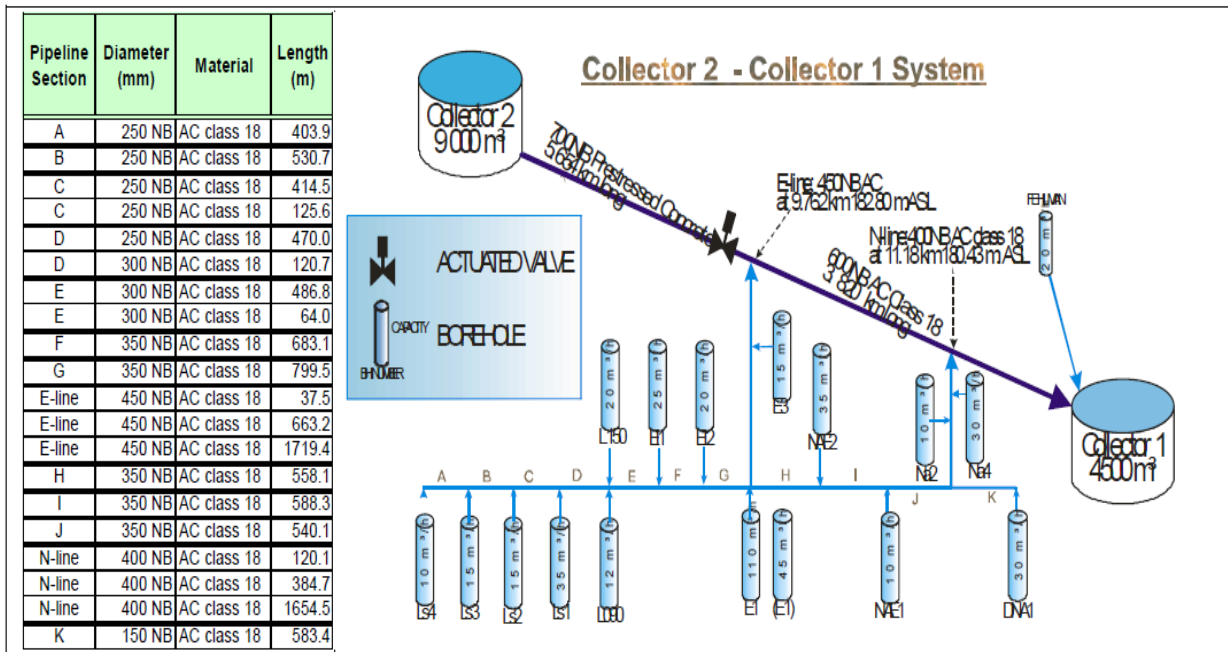
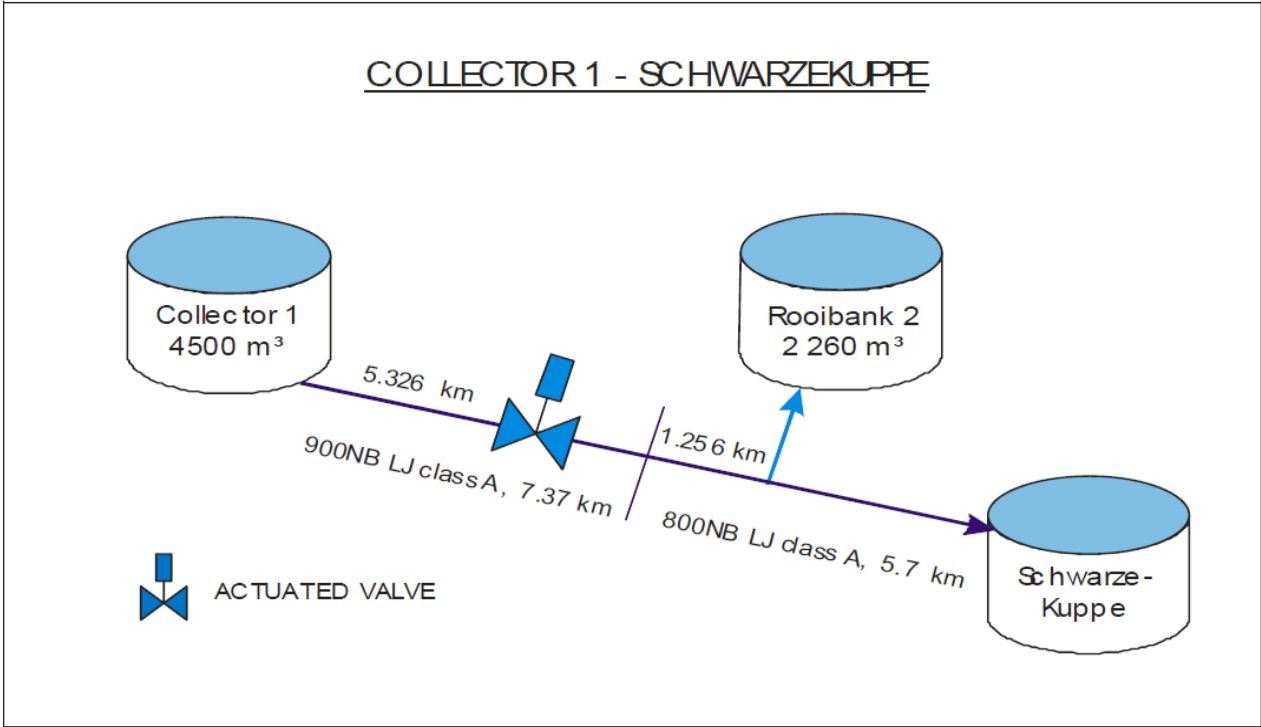
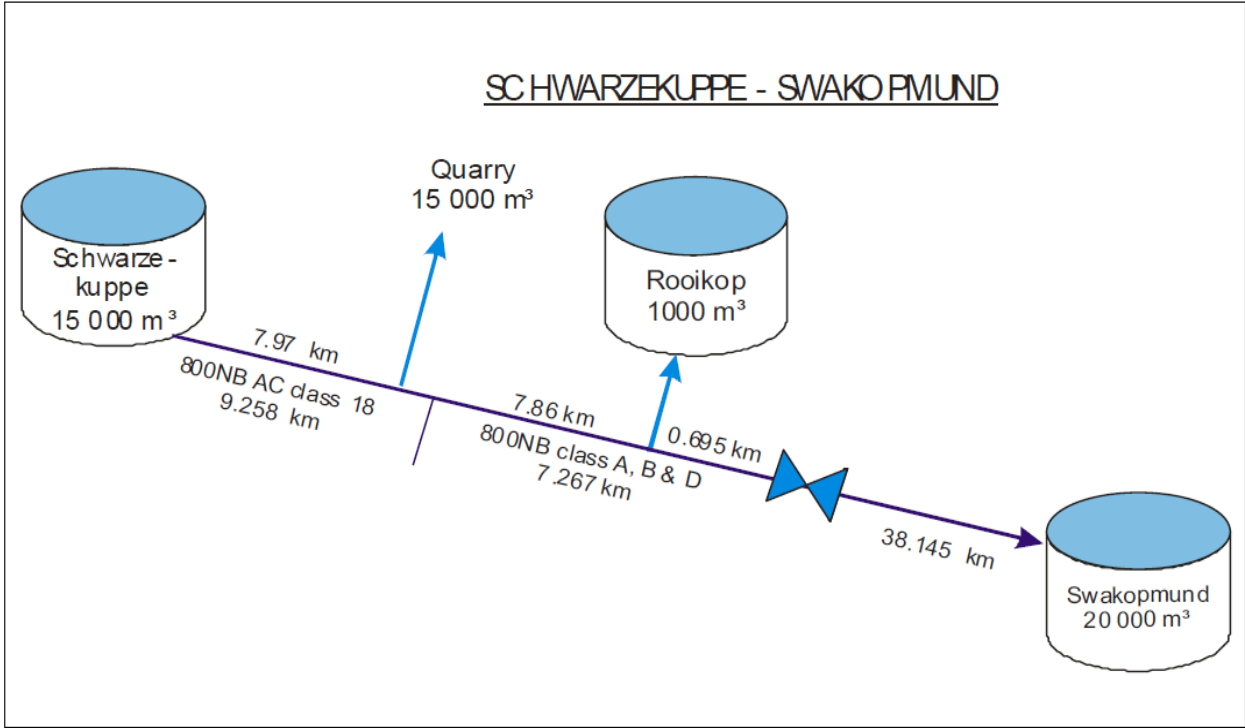


Figure 5: Schematic Layout of Collector 2 – Collector 1



**Figure: 6 Schematic Layout of Collector 1 – Schwarzekuppe**



**Figure: 7 Schematic Layout of Schwarzekuppe – Swakopmund**

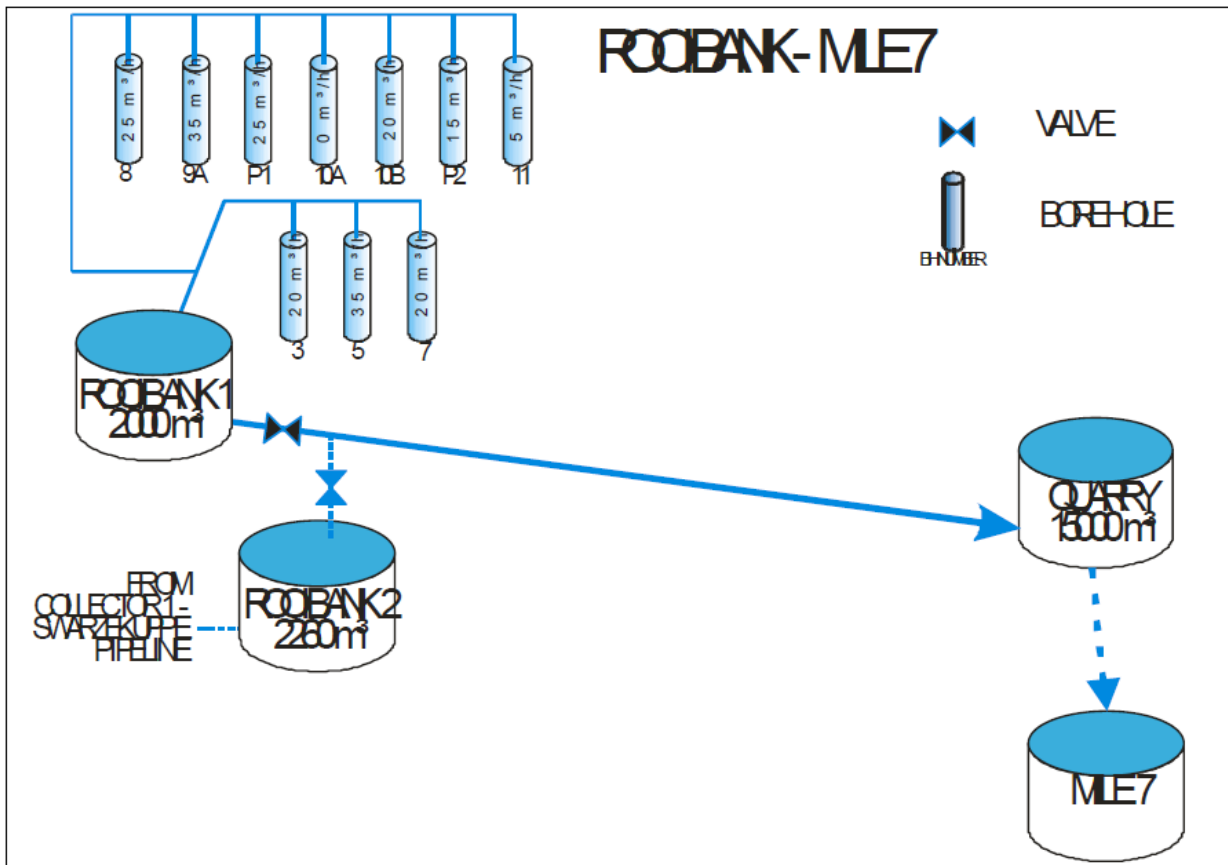


Figure: 8 Schematic Layout of Rooibank – Mile 7 Component

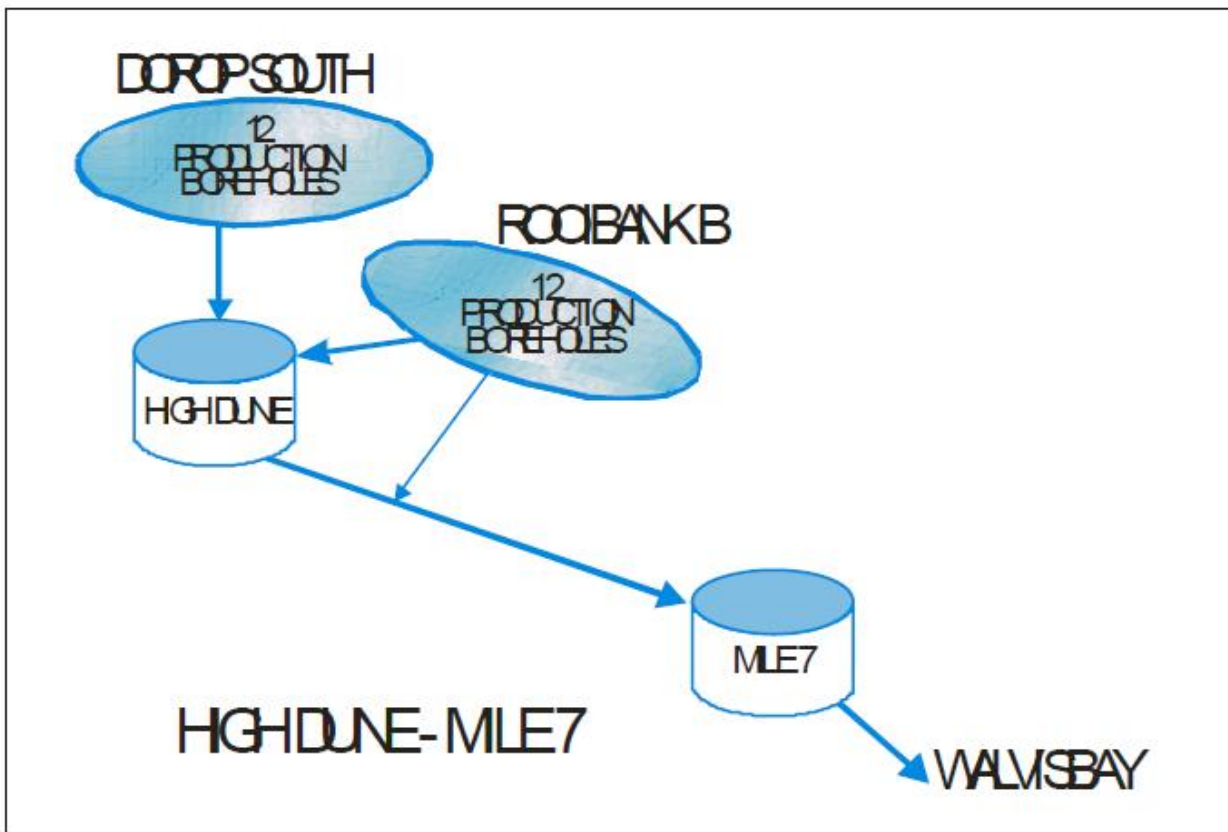


Figure: 9 Schematic Layout of High Dune – Mile 7 Component

## 4. BRIEF DESCRIPTION OF THE RECEIVING ENVIRONMENT

The baseline description provided below focuses on the receiving environment:

### 4.1 Climate

Kuiseb often has cool and a few foggy days. The cold weather experienced offshore derives from the cold Atlantic waters. The regions climate is generally moderate; nonetheless the winter east wind can bring intense cold weather to the coastline areas, often complemented by a dust blizzard (Mendelsohn, *et al.*, 2009).

#### 4.1.1 Precipitation

Kuiseb area experiences extremely low rainfall with the average of 0-50 mm, the wettest month is experienced in January, whilst the driest months fall between May and December (Mendelsohn, *et al.*, 2009).

#### 4.1.2 Temperature

The average minimum temperature is between 4 °C to 6 °C, the coldest month is August; the warmest month of the year is February. The average maximum temperature is found to be between 26 °C to 28 °C (Mendelsohn, *et al.*, 2009).

### 4.2 Geology

The geology of the area is known as the Central Namib-Windhoek region which extends from Windhoek in the east to the Atlantic Ocean in the west. The Ugab and Kuiseb rivers form the northern and southern boundaries.

The geology of the central region is dominated by the Damara Sequence. This sequence underlies most of central and northern Namibia. The basal arenitic succession of the Nosib Group was laid down between 850 and 700 million years (Ma) ago. The Kuiseb River forms the boundary between the gravel plains of the Central Namib and the Southern Namib sand sea, several Topnaar settlements abstract groundwater from dug wells in the Kuiseb River (Christelis *et al.*, 2011).

### 4.3 Natural Fauna and Flora

The area is sparsely populated by desert dwelling animals, the fauna has adapted to the severe climatic conditions experienced in the region. Animal species include the brown hyena (*Hyaena brunnea*), the rock hyrax (*Procavia capensis*), the Namib golden mole (*Eremitalpa granti namibensis*), and kudu (*Tragelaphus strepsiceros*) (Mendelsohn, *et al.*, 2009).

Kuiseb area is located in the Namib Desert Biome; the area's flora is moderately sparse. Kuiseb's vegetation includes the indigenous plants such as the Quiver tree (*Aloe dichotoma*), Sheperds tree (*Boscia albitrunca*), and the infamous welwitschia (*Welwitschia mirabilis*) known by other local names as the !kharos, N'tumbo, Onyanga.

Other plant species include the dollar bush (*Zygophyllum stapffii*), brakspekbos (*Zygophyllum simplex*) stands of ganna (*Salsola aphylla*) dune grass (*Elymus mollis*), feather-top (*Pennisetum villosum*), ostrich grass (*Struthio camelus*), desert sedge (*Carex resectans*), smooth lovegrass (*Eragrostis curvula*), (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 Kuiseb Delta 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 Kuiseb Delta 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 Kuiseb Delta 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 Kuiseb Delta Water 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 disposal 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 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.

**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**

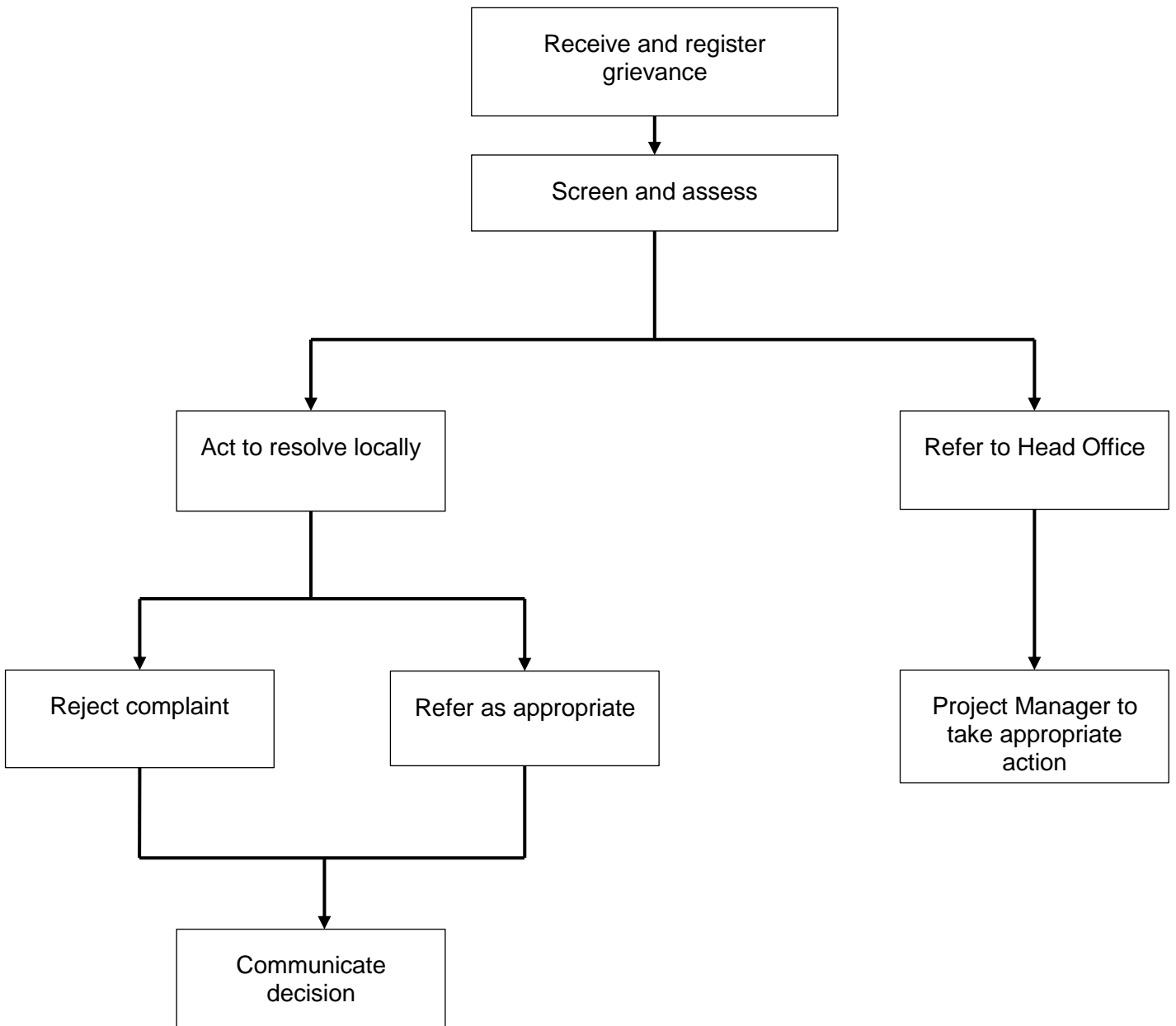
**Tell: 061-71 2105**

**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:	