



ENVIRONMENTAL MANAGEMENT PLAN

FOR

THE GOBABIS WATER SUPPLY SCHEME

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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
MEFT	Ministry of Environment, Forestry 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
WTW	Water Treatment Works

1. PURPOSE OF THE EMP

This Environmental Management Plan (EMP) has been compiled for the management of potential environmental impacts during the operation, and decommissioning phases of the proposed Gobabis 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 pipeline.

In terms of the Environmental Assessment Policy of 1994 and the Environmental Management Act (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).

An Environmental Clearance Certificate (ECC) was originally issued in 2020 and this EMP serves as an application for the renewal of the ECC.

2. INTRODUCTION

2.1 Gobabis Water Supply Schemes

Gobabis is situated in the Omaheke Region approximately 200 km east of Windhoek and is the commercial and administrative capital of the Omaheke Region. There are a number of sources supplying water to Gobabis reservoir.

These include the Gobabis Water Treatment Plant (GWTP) at Gobabis fed by the Otjivero, Tilda and Daan Viljoen dams, the boreholes of the Black Nossob, Gobabis (South Station) and North-east schemes. In the 2009/2010 financial year 790 087 m³ were sold from this scheme. Swart Nossob Boreholes is a groundwater scheme supplying water to three private consumers along the pipeline route as well as Gobabis during periods of surface water shortages.

2.2 Otjivero- Gobabis Scheme

The Otjivero-Gobabis scheme supplies treated water to a number of users at the Omaheke Regional Council for use in the Otjivero Settlement, the Otjivero Primary School, the Omitara Clinic, a NamWater Staff house and a few private consumers.

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

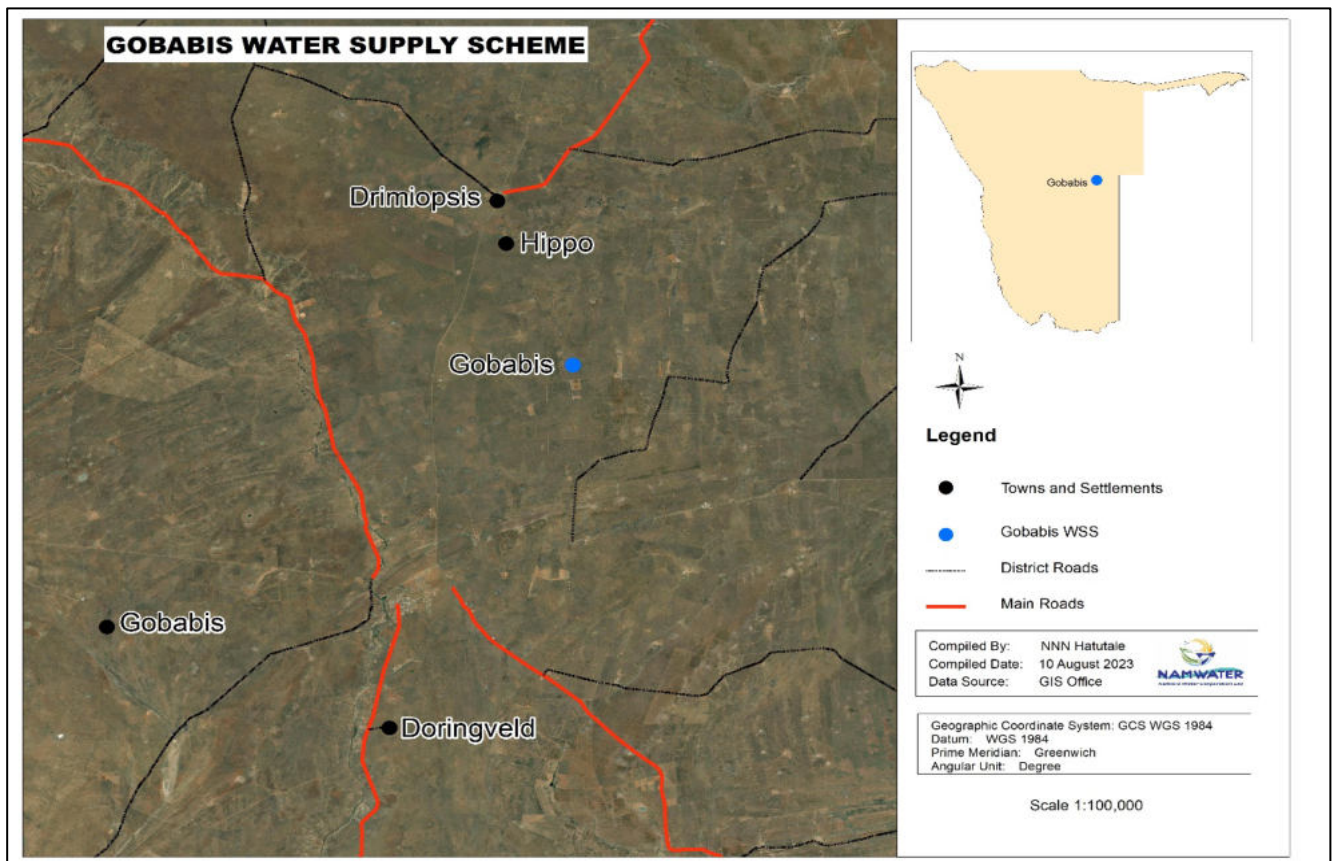


Figure 1 Gobabis Location Map

3. EXISTING GOBABIS WATER SUPPLY INFRASTRUCTURE

3.1 Water Source

2.1.1 Gobabis Purification Scheme

The Gobabis Purification scheme is a surface water scheme receiving raw water from Tilda, Daan Viljoen and Otjivero dams. The purification plant is 3.8 km west of Gobabis. The scheme supplies potable water to the Municipality of Gobabis.

2.1.2 Black Nossob Boreholes

The Black Nossob Borehole scheme supplies groundwater to the Municipality of Gobabis during periods of surface water shortages. The scheme consists of eight boreholes (WW 34884, WW 34885, WW 34923, WW 34928, WW 34929, WW 34930, WW 34931 and WW 35022), which pump water into the main line from Otjivero Dam to Gobabis into the three concrete reservoir system at Gobabis with a combined design capacity of 15 000 m³, from where it is distributed into the reticulation system.

The boreholes are between 20 m and 50 m deep. The yields of the boreholes vary between 5 m³/h and 11 m³/h.

2.1.3 North East Boreholes

The North East Borehole scheme supplies groundwater to the Municipality of Gobabis during periods of surface water shortages. The scheme consists of fourteen boreholes (WW 35212, WW 35215, WW 35219, WW 35224, WW 35229, WW 35234, WW 35237, WW 35238, WW 35243, WW 35186, WW 35190, WW 35197, WW 35203 and WW 35211), which pump water into the three concrete reservoir system at Gobabis with a combined design capacity of 15 000 m³ from where it is distributed into the reticulation system.

The boreholes are between 99 m deep and 150 m deep. The yields of the boreholes vary between 3 m³/h and 18 m³/h.

2.1.4 Gobabis South Station

Gobabis South Station scheme supplies groundwater to the Municipality of Gobabis during periods of surface water shortages. The scheme consists of four boreholes (WW 25870, WW 9860, WW 9862 and WW 9986), which pump water into the three concrete reservoir system at Gobabis with a combined design capacity of 15 000 m³ from where it is distributed into the reticulation system. The boreholes are between 60 m and 108.5 m deep. The yields of the producing boreholes vary between 10 m³/h and 15 m³/h.

2.1.5 Otjivero-Gobabis

The four dam system supplying water to the Gobabis Purification scheme via the Otjivero-Gobabis pipeline comprises of the Otjivero Silt Trap Dam, Otjivero Main Dam and the raw water pump station, Daan Viljoen Dam and Tilda Viljoen Dam. Water is transferred from the Otjivero Silt Dam via a gravity system or pumping depending on the water levels. Similarly water is transferred from the Daan Viljoen dam via a pump and a canal to the Tilda Viljoen Dam.

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

3.2 Dams

The surface water supply system which supplies the Gobabis Purification scheme with raw water comprises of a four dam system. The Otjivero Silt and Main dams are linked via the Otjivero-Gobabis pipeline with the Daan Viljoen and Tilda Viljoen dams.

2.2.1 Otjivero Silt Trap Dam

The primary purpose of the Otjivero Silt Trap Dam is to prevent silt reaching the Otjivero Main Dam. The construction of the Otjivero Dams was completed in October 1984.

The wall of the Silt Trap Dam at Otjivero is located within the natural basin of the Main Dam and its principal function is to force flood waters in the river to deposit their silt load before reaching the Main Dam. The embankment also improves the dam basin characteristics of the Main Dam by making the sides of the reservoir steeper and so reducing the surface area of

the water exposed to evaporation. An emergency spillway is provided by a lowered section of the earth fill embankment.

The embankment incorporates a concrete tower where the raw water intake works are located, allowing water to be transferred to the Main Dam. The water flows first by gravity from the Silt Trap Dam into the Main Dam until equilibrium of the water levels is reached. Thereafter the transfer of water is achieved by pumping.

The abstraction tower along with electrical submersible pumps forms part of the Otjivero Silt Trap Dam and transfers raw water to the Otjivero Main Dam.

2.2.2 Otjivero Main Dam

The Otjivero Main Dam forms the principal storage dam for water supply to Gobabis. The Main Dam together with the Silt Trap Dam has a combined safe yield of 0.72 Mm³. This is achieved by transferring as much water as possible from the Silt Trap Dam to the Main Dam, thereby reducing evaporation losses.

The intake structure and outlet works are housed within the dam wall. The raw water pump station is situated downstream of the main wall on the left bank of the White Nossob River.

The concrete dam wall with central spillway appeared to be in good condition and no obvious defects were observed.

2.2.3 Daan Viljoen Dam

The Daan Viljoen Dam was built on the western perimeter of the municipal area of Gobabis inside the Black Nossob River in 1957 and subsequently raised in 1958. This dam has a capacity of 400 000 cubic metres of water and a surface area of 0.203 km². Daan Viljoen Dam acts as a silt dam for Tilda Viljoen Dam. Water is pumped from Daan Viljoen Dam to Tilda Viljoen Dam to take advantage of the significantly better water retention properties of Tilda Viljoen Dam. The water is pumped out of Daan Viljoen Dam into an open canal in which the water flows by gravity to Tilda Viljoen Dam.

The abstraction tower along with the electrical pumps forms part of Daan Viljoen Dam and transfers raw water to Tilda Viljoen Dam

2.2.4 Tilda Viljoen Dam

Tilda Viljoen Dam was built in 1958 on the western perimeter of the municipal area of Gobabis as a pumped storage dam to improve the surface water storage capabilities at Gobabis. Tilda Viljoen Dam has a capacity of 1.25 million cubic metres and although the dam has no natural source of inflow, it has much better basin characteristics than Daan Viljoen Dam. It is therefore possible to achieve a much more efficient utilization of the runoff of the Black Nossob River by transferring water from Daan Viljoen Dam to Tilda Viljoen Dam.

The abstraction tower with electrical submersible pumps is used to transfer raw water from Tilda Viljoen Dam to Gobabis Purification Plant.

3.3 Water Quality and Disinfection

The quality of water supplied to Gobabis is evaluated for compliance with the NWQS and the NWQG. According to the NWQG the water quality complies with Group B which is suitable for human consumption (Appendix).

Gobabis Water Supply Scheme

A chlorine gas installation installed on the supply line from the borehole schemes appears to be operational and in fair condition.

3.4 Pipe Work

2.4.1. Gobabis Purification Scheme

The pipe work from the purification plant to the ground reservoir consists of approximately 1 400 m of 350 mm diam. FC pipe. The theoretical pipe capacity at a velocity of 1 m/s for the 350 mm diam. FC is 520 m³/h.

2.4.2. Black Nossob Boreholes

The pipe work from the boreholes to the ground reservoir consists of approximately 600 m of 160 mm diam. uPVC CL6, 3 900 m of 200 mm diam. uPVC CL6 pipes and 12 900 m of 250 mm diam. uPVC CL6 pipes and is reported to be in reasonable condition and no major leakage or pipe bursts occur on these lines. As-built scheme information could not be obtained at the time of this report. The appurtenances in general are in good condition. The theoretical pipe capacities at a velocity of 1 m/s for the 160 mm diam. uPVC, 200 mm diam. uPVC and 250 mm diam. uPVC pipes are 64 m³/h, 100 m³/h and 160 m³/h respectively.

2.4.3. North East Boreholes

The pipe work from the boreholes to the ground reservoir consists of approximately 5 300 m of 63 mm diam. uPVC CL6, 10 500 m of 110 mm diam. uPVC CL6 pipes, 6 400 m of 160 mm diam. uPVC CL6, 18 400 m of 250 mm diam. FC CL12 pipes and 10 700 m of 300 mm diam. FC CL12 pipes and is reported to be in reasonable condition and no major leakage or pipe bursts occur on these lines. As-built scheme information could not be obtained for this report. The appurtenances in general are in good condition.

The theoretical pipe capacities at a velocity of 1 m/s for the 63 mm diam. uPVC pipe, 110 mm diam. uPVC, 160 mm diam. uPVC, 250 mm diam. FC and 300 mm diam. FC pipes are 7 m³/h, 28 m³/h, 64 m³/h, 28 m³/h and 18 m³/h respectively.

2.4.4. South Station Boreholes

The pipe work from the boreholes to the ground reservoir consists of approximately 1 400 m of 110 mm diam. uPVC CL6 pipes and is reported to be in reasonable condition and no major leakage or pipe bursts occur on these lines. As-built scheme information could not be obtained for this report. The appurtenances in general are in good condition. The theoretical pipe capacity at a velocity of 1 m/s for the 110 mm diam. uPVC pipe is 28 m³/h.

2.4.5. Otjivero-Gobabis

The raw water pipeline from the Otjivero Dam to Gobabis consist of approximately 120 km 450 mm diam. fibre-reinforced cement pipe with a theoretical maximum flow capacity of 421 m³/h and is reported to be in reasonable condition with no major leakage or pipe bursts occurring on this line. Available information indicates a construction date of 1981 i.e., the pipeline is approximately 30 years old. However, there is no serious degradation of the pipeline at this stage. The appurtenances and manholes generally appear in good working condition.

3.5 Reservoirs

There are two ground level reservoirs at the Gobabis Scheme; a raw-water and a clear water reservoir. Both are round, concrete reservoirs with a capacity of 450 m³ each.

3.6 Water Treatment Plants

2.6.1. Otjivero Water Treatment Plant

The Otjivero Water Treatment Plant is supplied with raw water from the Otjivero Dam. A small, non-conventional batch type water treatment plant is situated close to the Otjivero Main Dam wall. The major components of the plant are; a sedimentation tank (batch process), in which turbid water is clarified by the addition of chemicals, two pressure sand filters and final chlorination.

The Otjivero Water Treatment Plant (OWTP) treatment works consists of the following major components:

- Flash mixing/flocculation stage during filling of the batch clarifier fed via a pumping station from the Otjivero Main Dam;
- After mixing and flocculation the water is retained for at least 2 hours in the Clarifier, (old flocculator/clarifier) for proper settling.
- Booster pumps, abstract water from a floating suction pipe on the clarifier which pump the water through 2 x parallel steel pressure sand filters to the 755 m³ reservoir located on a hill above the treatment works
- The sediment is flushed to the nearby White Nossob River after the clarified water is abstracted from the clarifier.

- Chlorination through floating dispensers in a small balance tank (10 m³) fed via a ball-valve from the reservoir.

The capacity of the purification plant is 150 m³ per day based on 3 batches per day during a single shift.

Gobabis Water Treatment Plant

A conventional water treatment plant (GWTP) with a capacity of 400 m³/h is located near the Daan and Tilda Viljoen Dams at Gobabis and was constructed in 1980. Raw water is supplied to the GWTP plant from Tilda Viljoen Dam. During the 3 months of the year (normal operation) that raw water is being transferred from the Otjivero Dam to Tilda Viljoen the purification works use the raw water directly from Otjivero Main Dam, during the other 16 hours of the day when the plant is not in operation water is pumped to Tilda Viljoen Dam.

The GWTP consists of the following major components:

- A set of lifting pumps (2 duty and 1 standby) at the Tilda Viljoen dam;
- Dosing of flocculent (Ultrafloc 3500) and lime slurry/flash mixing;
- Flocculation tank with mechanical agitation;
- Clarifier with collection launders to feed clarified water to the sand filters;
- Clarifier desludge system (manual operation);
- Intermediate chlorination before the sand filters;
- Four parallel sand filters with manual back wash control;
- Final chlorination in the contact tank/clear water feed sump; and
- Booster pumps, which pump the treated water to the 15 000 m³ reservoir located on a hill above the treatment works

The purification process includes coagulation, settling, filtration, disinfection and stabilisation with lime to prevent corrosion.

Chlorine gas is used for intermediate and final chlorination in the contact tank/clear water feed sump. The pumproom forms part of the purification works and houses three manually controlled electrical pumps (2 duty and 1 standby pump) which transfer clear water up to the storage reservoirs situated on the Nikodemus Hill. The water is then metered and distributed from the storage reservoirs into the water reticulation of Gobabis.

3.7 Power Supply and Control System

2.6.1. Gobabis Purification Scheme

The operation of the treatment plant together with the balancing of the supply dams is controlled manually. When the treatment plant is operational the operation takes place only during weekdays from 08h00 to 17h00. Electric power to the purification scheme is supplied from a ground transformer but the 3~phase kWh meter could not be located. Electricity is supplied by NamPower.

2.6.2. Black Nossob Boreholes

The Black Nossob scheme is linked to the Gobabis area office via telemetry and can be monitored and controlled remotely. The status of the boreholes is monitored by electronic pressure sensors.

Each of the boreholes is equipped with a MCC. Electric power to the boreholes is supplied from pole-mounted transformers each with a 3~phase kWh meter in a meter kiosk. Electricity is supplied by NamPower.

2.6.3. North East Boreholes

The North East Boreholes scheme is linked to the Gobabis area office via telemetry and can be monitored and controlled remotely. The status of the boreholes is monitored by electronic pressure sensors.

Each of the boreholes is equipped with a MCC. Electric power to the boreholes is supplied from pole-mounted transformers each with a 3~phase kWh meter in a meter kiosk. Electricity is supplied by NamPower.

2.6.4. South Station Boreholes

The South Station Boreholes scheme is linked to the Gobabis area office via telemetry and can be monitored and controlled remotely. The status of the boreholes is monitored by electronic pressure sensors. Each of the boreholes is equipped with a MCC. Electric power to the boreholes is supplied from a pole-mounted transformer with a 3~phase kWh meter in a meter kiosk. Electricity is supplied by NamPower.

2.6.5. Otjivero-Gobabis

The scheme is operated manually with the water flow in the pipeline being managed from Gobabis. Normal operation is three months continuous pumping during the winter months, normally May, June and July, after which Tilda Viljoen has sufficient stored water to supply Gobabis demand for the remaining 9 months.

The Otjivero-Gobabis pipeline is used to supply Witvlei with potable water from Grünental during drought. This means that while Witvlei is experiencing water shortage, raw water cannot be transferred from Otjivero Main Dam to Daan Viljoen Dam. Electric power to the booster pump station at Otjivero dam is supplied from a ground transformer with a 3~phase kWh meter in a meter kiosk. Electricity is supplied by NamPower.

2.6.6. Otjivero Water Treatment Plant

Electric power to the treatment plant at Otjivero dam is supplied from the same ground transformer as the booster pump station. Electricity is supplied by NamPower.

3.8 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.

3.9 Maintenance

Maintenance is done by a permanent NamWater team.

3.10 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.

3.11 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.

3.12 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.

3.13 Reservoirs

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

3.14 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.

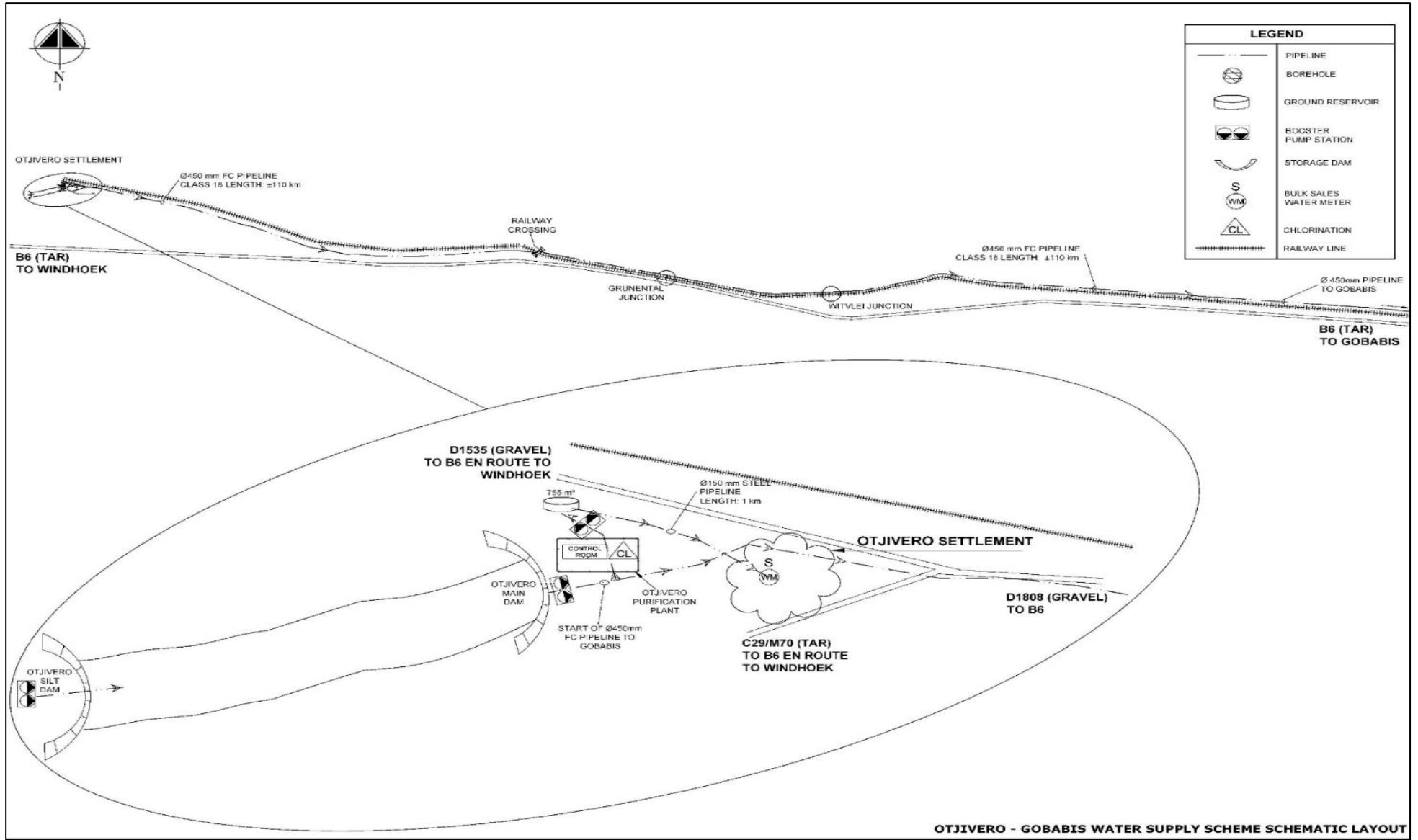


Figure 2 Otjivero – Gobabis Scheme Layout

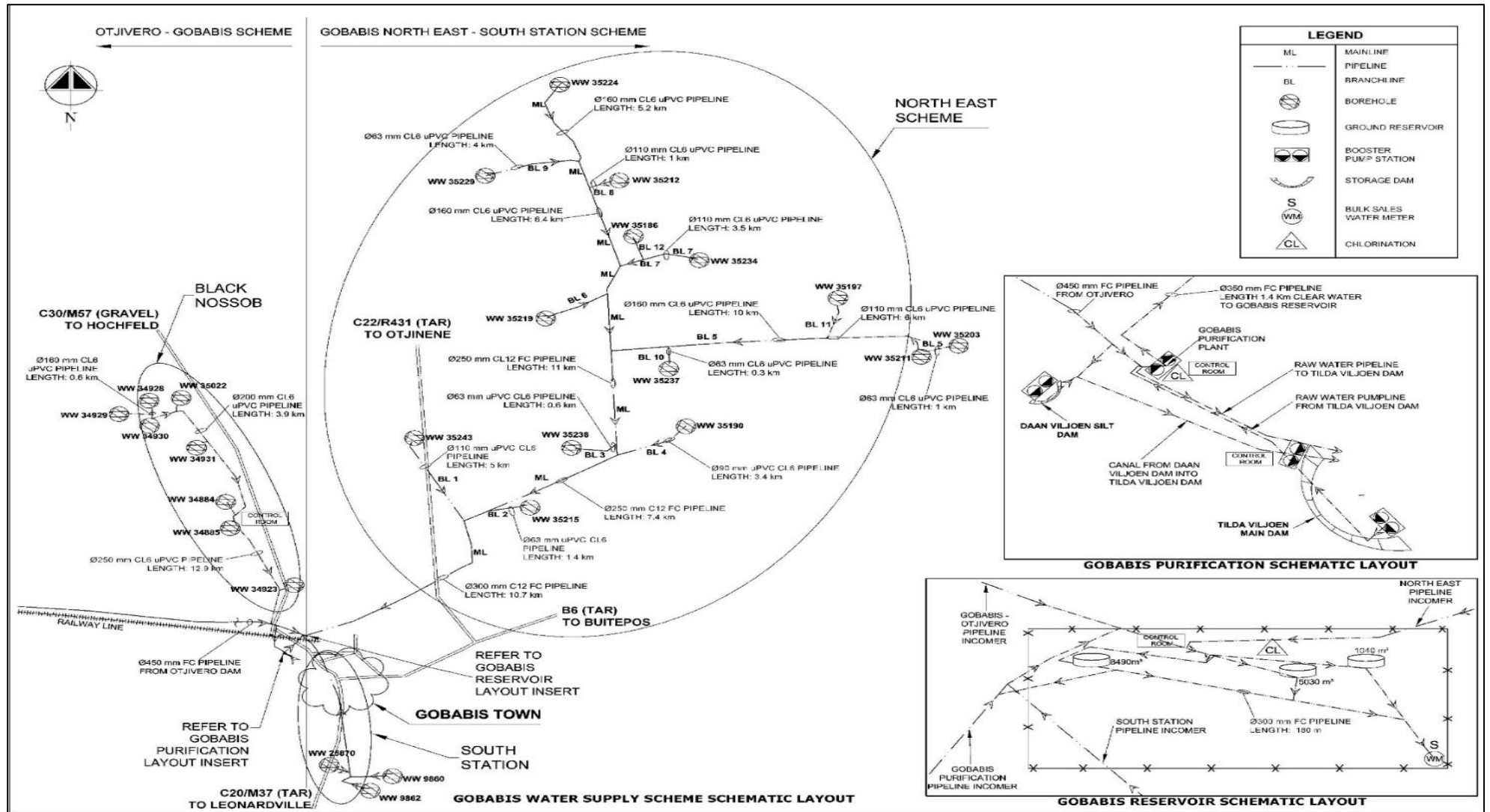


Figure 3 Gobabis Scheme Layout

4. BRIEF DESCRIPTION OF THE RECEIVING ENVIRONMENT

The baseline description provided below focuses on the receiving environment:

4.1 Climate

Most of the rain in the area falls as thundershowers in the summer months, from October to March. There is great variation between years, with the driest years having the least predictable rainfall. Gobabis has an extreme climate most times of the year with high temperatures especially during the rainy season and low temperature during the dry winter season, which is typical of central eastern Namibia.

3.1.1 Precipitation

The climate in Gobabis can be described as sub-arid with an average annual rainfall ranging from 350-400 mm. Evaporation in this area is between 1700-1900 mm per year (Mendelsohn *et al.*, 2002).

3.1.2 Temperature

The mean maximum temperature in the summer months in Gobabis ranges between 32-34°C. The mean minimum temperature in the winter months ranges between 2-4 °C, but they can drop below zero (Mendelsohn *et al.*, 2002).

4.2 Geology

The geology in the Gobabis area is made up of Kamtsas quartzite (Damara Sequence) and sediments of the Kuibis Subgroup (Nama Group), locally overlain by tillite and shale of the Dwyka Formation (Karoo Sequence). The fractured aquifers tapped by the various wellfields have moderate to high yields and receive fairly regular recharge (Christelis *et al.*, 2011:89).

4.3 Natural Flora

Gobabis is found within the Acacia Tree Shrub Biome, which is characterised by large, open-expanses of grasslands dotted with *Acacia* trees. The trees are tallest in areas of deeper sands in eastern Namibia (Mendelsohn *et al.*, 2002).

The tree and shrub savanna biome supports a moderate to high species diversity, which includes the protected *Aloe* species (*Aloaceae*) and other endemics. Much of the area is contains the *Acacia hereroensis* as well as open to semi-open, short bushland with mesic grassland species, such as *Themeda triandra*, *Brachiaria serrata* (Mendelsohn *et al.*, 2009).

Other grass species include the common species *Stipagrostis uniplumis*, *Eragrostis nindensis*, *Microchloa caffra* and *Monelytrum luederitzianum*. A conspicuous part of this vegetation type is the dwarfshrub species *Leucosphaera bainsii* (wolbos), and the *Ericcephalus luederitzianus* (kappokbos) (Mendelsohn *et al.*, 2009). *Acacia mellifera* dominates undulating lands; other dominant species are *A. hebeclada* subsp. *hebeclada*, *Catophractes alexandri* (trumpet thorn).

4.4 Fauna

Several species of fauna are found around in the Buitepos surrounds such as kudu (*Tragelaphus strepsiceros*), oryx (*Oryx gazella*), black wildebeest (*Connochaetes gnou*), waterbuck (*Kobus ellipsiprymnus*), springbok (*Antidorcas marsupialis*), duiker (*Sylvicapra grimmia*), black-backed jackal (*Canis mesomelas*), Warthog (*Phacochoerus africanus*), eland (*Taurotragus oryx*), Burchells zebra (*Equus quagga burchellii*), blue wildebeest (*Connochaetes taurinus*), hartebeest (*Alcelaphus buselaphus*), black faced impala (*Aepyceros melampus petersi*), steenbuck (*Raphicerus campestris*), African wild cat (*Felis silvestris lybica*), and the Namaqua sandgrouse (*Pterocles namaqua*) (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 Gobabis 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 Gobabis 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, MEFT: 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 MEFT: 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.

6.2 Contractor

The Contractor shall conduct his/her activities so as to cause the least possible disturbance to the existing amenities, whether natural or man-made, in accordance with all the current statutory requirements. Special care shall be taken by the Contractor to prevent irreversible damage to the environment. The Contractor shall take adequate steps to educate all members of his workforce as well as his supervisory staff on the relevant environmental laws and protection requirements. The Contractor shall supplement these steps with prominently displayed notices and signs in strategic locations to remind personnel of environmental obligations.

A suitably qualified independent ECO shall be appointed by NamWater/Contractor to undertake the following tasks:

- Liaison with Contractor, Interested and Affected Parties (I&APs) and Engineer regarding environmental matters.
- Monitoring of all of the Contractor's activities for compliance with the various environmental requirements at regular intervals.
- Routine environmental auditing and reporting of the Contractor's performance against the EMP.
- Reporting of environmental incidents and routine reporting of environmental issues associated with construction activities to NamWater, the Contractor and any relevant environmental authority.
- Identifying environmental non-conformances and initiating measures to remedy such issues, including the institution of fines against the Contractor.

The Contractor 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.

The Contractor shall construct and/ or implement all the necessary environmental protection measures in each area before any construction work may proceed. The Engineer/ ECO may suspend the Works at any time should the Contractor, in the Engineer/ Eco's opinion, fail to implement, operate or maintain any of the environmental protection measures adequately. The costs of such suspension shall be to the Contractor's account.

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.

MEFT 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 Gobabis 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.

8.1.2 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 Gobabis Scheme. 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 these 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.

Table 1: Operation and Maintenance Phase Management Table

Objectives	Potential Impact	Management Action	
<p>a. Minimize the loss of rare/ endangered fauna and flora species.</p>	<p>Loss of rare / endangered fauna or flora species.</p>	<ul style="list-style-type: none"> • Avoid small mammal / reptile and bird nesting where possible. Do not hurt, kill or unnecessarily disturb birds or animals. 	<p>Ensure scheme operations and maintenance is limited to the area next to the pipeline and reservoir corridors.</p> <p>Visual checks to ensure that no disturbance occur outside the pipeline corridor.</p> <p>Frequency: Monthly.</p> <p>Responsible Person: Scheme Supervisor.</p>
<p>b. Prevent unnecessary removal of trees/plants of importance.</p>	<p>Unnecessary removal of trees/plants of importance.</p>	<ul style="list-style-type: none"> • Do not remove any vegetation unless it is absolutely necessary. Make sure that operation and maintenance team is well informed. • Do not disturb, deface, destroy or remove plants or natural features, whether fenced or not. 	<p>Visual inspection/checks to prevent, as well as to ensure the unnecessary removal of trees/plants.</p> <p>Frequency: Monthly.</p> <p>Responsible Person: Scheme Supervisor.</p>
<p>c. Minimize the loss of rare/ endangered fauna and flora species.</p>	<p>Loss of rare / endangered fauna or flora species.</p>	<ul style="list-style-type: none"> • Avoid small mammal / reptile and bird nesting where possible. Do not hurt, kill or unnecessarily disturb birds or animals. 	<p>Ensure scheme operations and maintenance is limited to the area next to the pipeline and reservoir corridors.</p> <p>Visual checks to ensure that no unnecessary disturbance occur outside the pipeline and reservoir corridors.</p>

Objectives	Potential Impact	Management Action	
			<p>Frequency: Monthly.</p> <p>Responsible Person: Scheme Supervisor.</p>
<p>d. Prevent the poaching of flora and fauna.</p>	<p>Poaching of fauna and flora.</p>	<ul style="list-style-type: none"> • Employees who poach fauna and/or flora will be handed to the authorities for prosecution. • Regular checks of the surrounding environment must be undertaken to ensure no traps or snares have been set. Any snares or traps found on or adjacent to the site must be disposed of. 	<p>Visual inspection.</p> <p>Frequency: Weekly visual checks.</p> <p>Responsible Person: Scheme Supervisor</p>
<p>e. Minimise the creation and use of tracks outside existing roads.</p>	<p>Creation of tracks outside existing roads.</p>	<ul style="list-style-type: none"> • Use existing roads. • Traffic shall be controlled to ensure minimal disruption to other road users. • Do not construct new roads when the quality of existing roads deteriorates. Where possible, repair or upgrade existing roads. • Ensure that adequate vehicle turning areas are allowed for. • Enforce speed limits at all times. Unless otherwise specified, the speed limit on access roads is 50km/h. • Runoff from roads must be managed to avoid erosion and pollution problems. • Roads not required for further use shall be rehabilitated immediately. • Use 3-point turns and not U-turns. Confine turning to the road. 	<p>Visual checks to ensure that no off-road driving exists.</p> <p>Frequency: Weekly.</p> <p>Responsible Person: Scheme Supervisor.</p>

Objectives	Potential Impact	Management Action	
		<ul style="list-style-type: none"> Prevent shortcuts between roads. 	
f. Minimise the damage and destruction of important palaeontological and archaeological sites.	Disturbance to sites of palaeontological and archaeological importance.	<ul style="list-style-type: none"> Do not disrupt any archaeological or palaeontological sites. Inform NEM (J Kamburona at cell no 081 144 1528) who will take the necessary action. All workers will be educated about the importance of preserving archaeological sites. Educate specific workers about tell-tale signs of archaeological sites and the action to be taken if one is identified 	<p>Monitoring can and should involve field induction of key scheme personnel so that they will be able to recognize the important palaeontological and archaeological sites themselves.</p> <p>Frequency: Monthly.</p> <p>Person Responsible: Scheme Supervisor.</p>
g. Minimise the number of heavy vehicles on the road.	Increased number of heavy vehicles on the road.	<ul style="list-style-type: none"> Heavy vehicles should be limited to numbers necessary. 	<p>Checks to ensure that there is minimal heavy vehicle on the road.</p> <p>Frequency: Weekly.</p> <p>Responsible Person: Scheme Supervisor.</p>
h. Minimise and if possible prevent the activities that accelerate erosion during operation or maintenance.	Erosion.	<ul style="list-style-type: none"> Runoff on steep inclines should be diverted to prevent the formation of erosion gullies. Vegetative cover is the most efficient and economical means of controlling soil erosion. Berms should be constructed at selected intervals on long sloping areas to prevent erosion. Diversion berms should be reshaped as necessary to divert runoff. 	<p>Visual inspection to ensure that activities that accelerate soil erosion are minimised and if possible prevented at all cost.</p> <p>Frequency: Weekly.</p>

Objectives	Potential Impact	Management Action	
		<ul style="list-style-type: none"> Berms should be constructed with compacted soil, have a minimum top width of 60 cm and a minimum height of 30 cm, and should allow for 10% settlement. It should have side slopes with a gradient of at least 2:1. Runoff should be guided to a point where it will not cause damage. Scour by the discharge of runoff should be prevented. 	Responsible Person: Scheme Supervisor.
i. Minimise and if possible prevent the collection and removal of firewood during operation and maintenance.	Collection of firewood.	<ul style="list-style-type: none"> No vegetative matter may be removed for firewood. The collection and removal of firewood is not allowed. 	<p>Checks to ensure that there's no removal and collection of firewood by the employees.</p> <p>Frequency: Weekly.</p> <p>Responsible Person: Scheme Supervisor.</p>
j. Noise	Generation of noise	<ul style="list-style-type: none"> Install and maintain silencers on trucks and machinery. Repair faulty brakes. Operators should not use hooters for the purposes of general communication. 	<p>Visual inspection to ensure that activities that generate noise are minimised and if possible prevented.</p> <p>Frequency: Daily.</p> <p>Responsible Person: Scheme Supervisor.</p>
k. Driving	Increased risk for accidents	<ul style="list-style-type: none"> No operator will operate any equipment when he is under the influence of alcohol. Adhere to safety rules. Always keep your headlights on. 	<p>Visual inspection to ensure that activities that generate noise are minimised and if possible, prevented.</p> <p>Frequency: Weekly.</p>

Objectives	Potential Impact	Management Action	
		<ul style="list-style-type: none"> Drivers must have the correct licence for the vehicle they are driving. 	Responsible Person: Scheme Supervisor.
l. To avoid potential chemical /hazardous substance pollution	Pollution	<ul style="list-style-type: none"> Designated areas for the storage of potentially hazardous material will be lined with concrete and secured. The bunded area will be of adequate capacity to contain 1.5 times the volume of the hazardous material to be stored in the bunded area. 	<p>Visual checks to ensure chemical/hazardous substances are stored appropriately.</p> <p>Frequency: Monthly.</p> <p>Responsible Person: Scheme Supervisor.</p>
m. 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	Environmental Degradation	<ul style="list-style-type: none"> Establish regular reporting procedures on maintenance Undertake regular inspection and maintenance of all infrastructure to ensure in working order and to assess damaged / deficient equipment, as per the Operations and Maintenance Manual. Review, and if necessary, revise maintenance manual. Establish emergency procedures guidelines for the blockage/failure, flooding, contaminant removal and disinfection, power failure and fire of the scheme. Implement the response procedures when emergency incident occurs. Complete the incident report checklist in the case of emergency and keep with monitoring records for submission. Undertake annual education course for all operational staff. 	<p>A review of the Operations and Maintenance Manual.</p> <p>Frequency: Bi-annual</p> <p>Responsible Person: NamWater Maintenance Team</p>

Objectives	Potential Impact	Management Action	
		<ul style="list-style-type: none"><li data-bbox="875 252 1608 284">• Review, and if necessary, revise emergency manual.	

Table 2: Waste Management Table

Objectives	Potential Impact	Management Action	
<p>a. To prevent the improper disposal of waste</p>	<p>Pollution</p>	<ul style="list-style-type: none"> • Enforce a waste management programme. • All waste will be removed to an appropriate waste dump. • No waste should be buried. • General Waste: Includes wastepaper, plastic, cardboard, harmless organic (e.g. vegetables) and domestic waste. • Hazardous Substances include sewerage, fuels, lubrication oils, hydraulic and brake fluid, solvents, paints, anticorrosive, 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 an hazardous spill: <ul style="list-style-type: none"> • Immediately implement actions to stop or reduce the spill. • Contain the spill. • Arrange implementation of the necessary clean-up procedures. 	<p>Visual check to ensure wastes is managed according to the waste management plan</p> <p>Frequency: Weekly.</p> <p>Person Responsible: Scheme Supervisor.</p>

Objectives	Potential Impact	Management Action	
		<ul style="list-style-type: none"> • 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. 	
<p>b. Prevent diesel and oil spills during operation and maintenance and ensure adequate clean up.</p>	<p>Concrete, diesel and oil spills and inadequate clean up.</p>	<ul style="list-style-type: none"> • Clean up concrete, fuel and oil spills immediately. • Clean small oil or fuel spills with an approved/appropriate absorbent material. • Contain oil or fuel spills in water using an approved oil absorbent fibre. • In cases where oil spills cannot be cleaned up immediately, monitor seepage into deeper soils and groundwater. • Do not bury polluted soil, but rather dispose it at an appropriate dump site. • Provide bunding at fuel storage and transfer sites. The bunding should be big enough to contain 110% of the volume of the tank. Where a bund wall encloses a group of tanks, the bund wall must be able to contain 110% of the volume of the largest tank in the group. Tanks must stand 	<p>Checks to prevent and minimise oil and diesel spills and to ensure adequate clean up should spills occur.</p> <p>Frequency: Daily throughout the operation period.</p> <p>Responsible Person: Scheme Supervisor.</p>

Objectives	Potential Impact	Management Action	
		<p>on a concrete slab, or otherwise have a sealed, base in order to prevent the leakage of contaminants into the soil.</p>	
<p>c. Waste Management</p>	<p>Littering (Litter such as paper, plastic etc. can be blown away into the surrounding environment).</p>	<ul style="list-style-type: none"> • No littering will be allowed. The operation and maintenance areas will be kept free of waste at all times. All maintenance sites will be cleaned on a daily basis before leaving the site. • Provide sufficient waste bins at worksites. Make sure that all waste is removed from the worksites. • Bins should be placed in pairs to ensure that one is always present while the other is being emptied. • Areas likely to generate higher quantities of waste shall be equipped with additional bins. • Refuse bins must be stable, i.e. cannot be tipped by animals, and have scavenger and baboon proof lids. • Make sure that the bins are covered so that plastic bags, paper etc. are not blown away. • Make sure that the bins are regularly emptied and the waste taken to an appropriate waste dumpsite. • The central waste storage vessel shall be emptied weekly or as necessary. 	<p>Checks to ensure that litter is disposed of correctly in bins provided.</p> <p>Frequency: Daily, at the end of the work day.</p> <p>Responsible Person: Scheme Supervisor.</p>

Table 3: Workshops, Vehicle and Equipment Management Table

Objectives	Potential Impact	Management Action	
<p>a. Appropriate storage of machinery, vehicles and materials.</p>	<p>Inappropriate storage of machinery, vehicles and materials may result in the possible damage/disturbance of nearby undisturbed environments.</p>	<ul style="list-style-type: none"> • Store machinery, vehicles and materials only in demarcated areas; • Do not leave machinery and equipment standing around if not in use; • Do not store machinery, vehicles or materials in undisturbed or rehabilitating areas 	<p>Regular inspection to ensure that machinery, vehicles and equipment are stored in designated areas.</p> <p>Frequency: Daily.</p> <p>Responsible Person: Scheme Supervisor.</p>
<p>b. Minimize the leakage of fuels and lubricants from vehicles and equipment.</p>	<p>The use of vehicles and equipment that may leak fuel and lubricants.</p>	<ul style="list-style-type: none"> • Only service machinery and vehicles in designated areas. • Regularly check your vehicle for fuel and oil leaks. • Maintain vehicles and equipment in good conditions through regular and thorough servicing. • Inform the Foreman of leaking vehicles and machinery so that he can schedule repairs. • Only refuel on the bund created for that purpose. • Immediately clean any accidental fuel and oil spills – do not hose spills into the natural environment. • Dispose of contaminated soil as hazardous waste in the correct location on site. • If a mobile fuel bowser is used, then all refuelling shall occur with appropriate measures in place to prevent spillages (drip trays, funnels, non-dripping dispensing nozzles etc.) 	<p>Visual inspection to ensure that vehicles and equipment are in excellent condition and also to ensure that there is no leakage of fuels and lubricants.</p> <p>Frequency: Daily.</p> <p>Responsible Person: Scheme Supervisor.</p>

Objectives	Potential Impact	Management Action	
		<ul style="list-style-type: none"> • All mobile fuel browsers shall carry a spill kit that is adequately sized to contain at least a 200 litre spill. • Train staff in the correct procedure/technique to transfer fuels. • Make sure all vehicles are roadworthy. Repair faulty brakes, exhausts etc. immediately. • Fire extinguishers shall be present whenever undertaking any form of hot work, i.e. welding, gas cutting, angle grinding, etc. 	

Table 4: Health and Safety Management Table

Objectives	Potential Impact	Management Action	
a. Minimise the risk of HIV infection and the increase of STI's.	Risk of HIV infection.	<ul style="list-style-type: none"> • Provide an AIDS awareness programme to all the staff. 	<p>Verify that an awareness and education programme on the risks of HIV/AIDS and recommended preventative measures has been conducted.</p> <p>Frequency: Monthly</p> <p>Responsible Person: Scheme Supervisor.</p>
b. Minimise the occurrence of injuries.	Injuries.	<ul style="list-style-type: none"> • 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 the scheme offices and at maintenance sites. • 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. 	<p>Checks to ensure that correct procedures are followed and that protective clothing are worn at all times during scheme operations and maintenance.</p> <p>Frequency: Check weekly.</p> <p>Responsible Person: Scheme Supervisor.</p>

Objectives	Potential Impact	Management Action	
		<ul style="list-style-type: none"> • 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 operation and maintenance to its original 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 operation and maintenance of the scheme and pipelines, could be mitigated and restored to an acceptable level. Poorly rehabilitated areas provide a difficult legacy issue for governments, communities, and companies, and ultimately tarnish the reputation of companies 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 MEFT.
- 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 been 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 maintenance 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 maintenance 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 maintenance 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

17. **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.
18. Never feed, tease, play with, or set devices to trap any animal or livestock. Wild animals are not to be domesticated.
19. Keep off the rock outcrops unless given specific permission by the SCHEME SUPERVISOR to be there.
20. Never cut down any tree or branches for firewood.
21. Never leave rubbish or food scraps or bones where it will attract animals, birds, or insects.
22. Rubbish must be thrown into allocated waste disposal bins/bags.
23. Always close the gates behind you.

Preventing Pollution

24. Only work with hazardous materials in bunded areas.
25. 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.
26. Clean up spills immediately.
27. 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.
28. Immediately report to your SCHEME SUPERVISOR when you notice any container, which holds hazardous substances overflow, leak or drip. Spillage must be prevented.
29. Only wash vehicles, equipment and machinery, containers and other surfaces at work site areas designated by your SCHEME SUPERVISOR.
30. Do not change oil on uncovered surfaces.
31. If you are not sure how to transport, store, use, or get rid of any hazardous substances ask your SCHEME SUPERVISOR for advice.

Health

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

Dust Control

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

Saving Water

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

Working Hours

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

Archaeological and Cultural Objects

45. If you find any archaeological, cultural, historical or pre-historical object on the maintenance site you must immediately notify your SCHEME SUPERVISOR.
46. 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

47. Tracks and roads should be kept to a minimum. Where possible follow existing roads.
48. No off-road driving is allowed.
49. Never drive any vehicle without a valid licence for that vehicle class and do not drive any vehicle that is not road-worthy.
50. Never drive any vehicle when under the influence of alcohol.
51. **Always** keep your headlights on when driving on dusty roads.
52. Keep to the roads as specified by your SCHEME SUPERVISOR. Vehicles may only be driven on demarcated roads. Drivers should always use three-point turns, "u-turns" are not allowed. Do not cut corners.
53. Do not drive on rocky outcrops.

Noise

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

Fire Control

56. Do not make open fires, use a drum or tin and do not collect any vegetation to burn.
57. 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.
58. Cigarette butts should always be thrown in allocated refuse bins. Make sure that the cigarette butt is out before throwing it into the bin.
59. Immediately notify your SCHEME SUPERVISOR if you see an unsupervised fire at the campsite or maintenance site.

Dealing with Environmental Complaints

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

Jolanda Kamburona

Tell: 061-71 2105

Cell: 081 144 1528

or

Fillemon Aupokolo

Tell: 061-71 2095

Cell: 081 325 3301

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GRIEVANCE PROCEDURE

All grievances should be submitted through the completion of the grievance registration form as presented below and submitted to the Scheme Supervisor during the construction phase and to the Scheme Superintendent during the operation and maintenance phase.

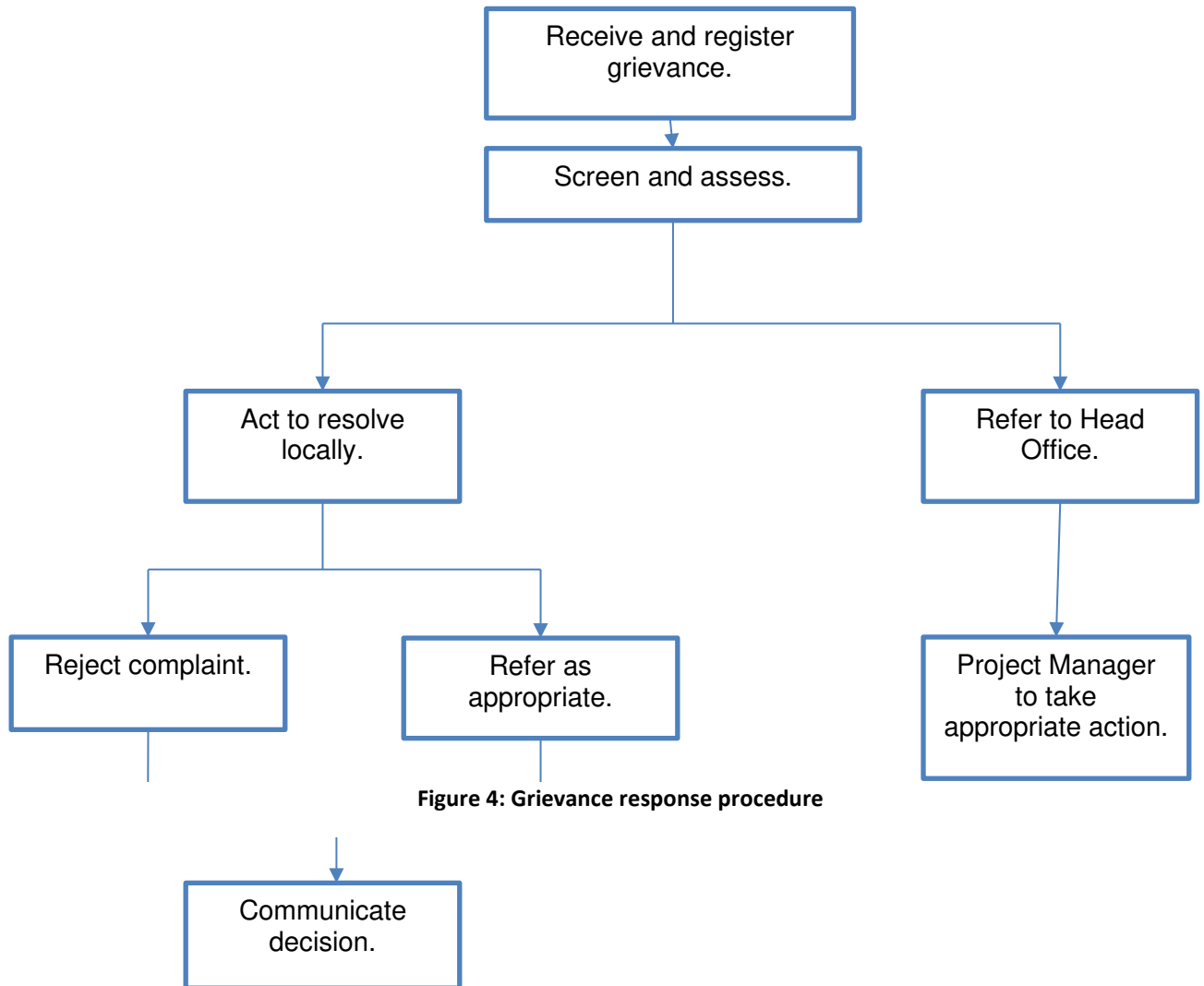


Figure 4: Grievance response procedure

Upon receipt of the registered grievance forms, the Scheme Supervisor shall screen and assess to either act to solve the grievance locally or refer it to head office. If the grievance is referred to the head office, the line manager should decide. If the grievance is to be solved locally, it should either be rejected or handled appropriately of which the decision should be communicated to the aggrieved person.

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:	