ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE CONSTRUCTION OF THE REPLACEMENT PIPELINE FOR THE GIBEON WATER SUPPLY SCHEME

A PROJECT BY NAMWATER

SCOPING REPORT: For Submission to Authorities

February 2026

LANA ENVIRONMENTAL
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NAMWATER
Namibia Water Corporation Ltd

DOCUMENT STATUS

EIA PHASE	Scoping Phase
PROJECT TITLE	Environmental and Social Impact Assessment for the Construction of the Replacement Pipeline for the Gibeon Water Supply Scheme
PROJECT LOCATION	Gibeon, Hardap Region
PROJECT REFERENCE	Gibeon Upgrade Project
PROCUREMENT REFERENCE NUMBER	SC/RP/NW – 001/2026
ECC APPLICATION NUMBER	APP – 251106006619
COMPETENT AUTHORITY	Department of Environmental Affairs (Ministry of Environment, Forestry and Tourism) Department of Water Affairs (Ministry of Agriculture, Fisheries, Water and Land Reform)
PROPONENT & EXECUTING AGENT	Namibia Water Corporation Private Bag 13389 176 Iscor Street Windhoek Department of Applied and Scientific Services
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NON – TECHNICAL SUMMARY

Background

The Gibeon Water Supply Scheme, located in the Hardap Region, supplies potable water to the settlement of Gibeon and surrounding farms through a 53.3 km bulk pipeline. The scheme sources water from two production boreholes at Farm Orab, each with a yield of 80 m³/hr and delivers water by gravity into the settlement's terminal reservoir. The current infrastructure, comprising asbestos cement (AC) and uPVC pipeline sections, has become unreliable due to ageing and frequent bursts. Records show 146 pipeline breaks between May 2021 and May 2023, resulting in water losses, high maintenance costs, and disruptions to households, businesses, and farms.

Need and desirability of project

The ageing pipeline poses a significant risk to secure water supply in the South Water Supply Area. Frequent failures undermine service reliability, increase operational costs, and waste scarce water resources. The proposed Gibeon Upgrade Project seeks to replace the deteriorating pipeline sections with new, durable materials and restore efficient water distribution. By doing so, the project will ensure sustainable supply, reduce water losses, and improve resilience for households, schools, public institutions, resettlement communities, and commercial farmers in the area.

Proposed project

The upgrade will be implemented in two phases:

- **Phase 1:** Upgrade and automation of the system, including telemetry replacement, installation of flow meters, and fitting of variable speed drives to improve monitoring and operational efficiency.
- **Phase 2:** Full replacement of the existing 53.3 km bulk pipeline with M-PVC pipe (DN200 for the first 40 km, DN160 for the remaining 13.2 km). The new line will be buried parallel to the existing pipeline within the registered servitude to minimise land disturbance and avoid water supply interruptions. Alternatives considered included an above-ground pipeline (rejected for visual and socio-economic reasons) and a no-project option (not viable due to ongoing failures).

Alternatives considered included an above-ground design, a buried pipeline design, and a no-project option. The underground alternative was chosen as it reduces socio-economic impacts and avoids visual disturbance.

Environmental and social impact assessment process

Lana Consultancy was appointed as the independent Environmental Assessment Practitioner to carry out the ESIA in line with the Environmental Management Act (No. 7 of 2007) and its Regulations. Baseline information was gathered from site visits, technical reports, and consultations with NamWater, the Gibeon Village Council, regional authorities, farmers, and other stakeholders. A public meeting was held to capture community views, where issues such as offtakes, construction impacts, and water interruptions were raised.

Potential impacts of the project

The scope of the ESIA included assessing potential environmental and social impacts associated with the construction, operation, and future decommissioning of the proposed

Gibeon Upgrade Project. Information was gathered through site reconnaissance, review of secondary data, and consultation with stakeholders.

The ESIA identified potential impacts that may occur during the different phases of the project. These are summarised below:

1. **Construction Phase**

- *Biophysical impacts*: soil disturbance and erosion; dust and emissions; habitat disturbance and loss of flora; possible loss of plants due to illegal collection; contamination from bulk earthworks; disturbance to local fauna; pipeline trenches acting as pitfalls; waste generation; and risks of fuel or lubricant spills and leaks.
- *Socio-economic and cultural impacts*: risks linked to migrant construction workers (including HIV/AIDS and informal settlements); community and occupational health and safety hazards; heritage concerns; and positive impacts through employment opportunities for local people.

2. **Operational Phase**

- Improved water supply reliability
- Enhanced socio-economic resilience of households and farms
- No significant long-term impacts on flora and fauna
- Reduced maintenance disruptions compared to the old pipeline
- Economic prosperity through improved water security
- Risks of theft and vandalism of pipeline infrastructure

3. **Decommissioning Phase**

- Localised disturbance from dismantling and reinstating sites
- Potential waste generation from decommissioned materials
- Opportunities to rehabilitate sites, restore disturbed areas, and leave the land in a stable condition

Stakeholder consultation and public participation

The ESIA followed the Environmental Management Act (No. 7 of 2007) and EIA Regulations (2012). An inception meeting was held on 28 August 2025 to initiate the study. A Background Information Document (BID) was prepared and circulated to stakeholders to explain the project and invite input. Public notices were placed in The Namibian (6 & 16 September 2025) and New Era (10 & 16 September 2025), and site notices were posted at public offices in Gibeon; Interested and Affected Parties were given 21 days (to 03 October 2025) to register and comment. A consultation meeting with the Gibeon Village Council took place on 22 September 2025, followed by a public meeting at the Gibeon Community Hall on 23 September 2025 to present the project and receive feedback. A second-round notification (1 February 2026) invited comments on the Draft Scoping Report within the prescribed 7-day period.

The main issues that were raised are as follows:

1. **Employment and Economic Opportunities**
    - Community members requested priority recruitment of local labour.
    - Concerns were raised that employment should not only target youth but also include skilled individuals aged 36–59.
2. **Water Access and Infrastructure**
    - Requests were made to relocate water meters to the other side of the road for easier access.
    - Concerns about locked meters preventing households from monitoring usage.
    - Responsibility for water losses due to pipeline breakages was raised; clarity was sought on who would bear the costs.
3. **Water Tariffs and Payment Systems**
    - Questions on whether the new pipeline would reduce water tariffs.
    - Requests for prepaid water systems to help prevent debt accumulation.
    - Elderly residents raised difficulties accessing payment points and concerns about unfair billing where some pay regularly while others default.
4. **Project Justification and Past Experiences**
    - Community members acknowledged long-standing issues of frequent pipeline breakages.
    - The project was generally welcomed as addressing these persistent problems and improving water reliability.

Conclusion

This ESIA report provides information to enable the Department of Water Affairs (DWA) and the Directorate of Environmental Affairs (DEA) to make informed decisions regarding the proposed Gibeon Upgrade Project. An accompanying Environmental and Social Management Plan (ESMP) has also been prepared, which should be read in conjunction with this report. The ESMP will serve both as a mitigation tool and as an on-site reference document during all phases of the project — planning, construction, operation, maintenance, and eventual decommissioning.

The ESIA demonstrates that all potential environmental and social impacts can be mitigated to acceptable levels. The project is considered necessary and desirable to ensure reliable water supply, reduce water losses, and support local livelihoods and economic development. Therefore, based on the findings of this assessment, and provided that all recommended mitigation measures are effectively implemented, there are no environmental grounds to withhold the issuance of an Environmental Clearance Certificate for the proposed Gibeon Upgrade Project.

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List of abbreviations & Acronyms

BID:	Background Information Document
DEA:	Directorate of Environmental Affairs
DCI:	Ductile Cast Iron
DWA:	Department of Water Affairs
EAP:	Environmental Assessment Practitioner
ECC:	Environmental Clearance Certificate
ESIA:	Environmental and Social Impact Assessments
EMA:	Environmental Management Act No. 7 of 2007
ESMP:	Environmental and Social Management Plan
GN:	Government Notice
HDPE:	High-Density Polyethylene
I&APs:	Interested and Affected Parties
MAWLR:	Ministry of Agriculture, Water, and Land Reform
MEFT:	Ministry of Environment, Forestry, and Tourism
M-PVC:	Modified Polyvinyl Chloride
MSDS:	Material Safety Data Sheet
NHC:	National Heritage Council
PPE:	Personal Protective Equipment
NamWater:	Namibia Water Corporation Ltd
ToR:	Terms of Reference
SCADA:	Supervisory Control and Data Acquisition
uPVC:	Unplasticised Polyvinyl Chloride
VSD:	*Variable Speed Drive*
HDPE:	High-Density Polyethylene

1 INTRODUCTION AND BACKGROUND

This chapter of the report provides a background and motivation for the project; the study's terms of reference; the purpose of this report; the assumptions and limitations of the study; and an outline of the remainder of the report.

1.1 INTRODUCTION

The proposed Gibeon Upgrade Project was initiated to replace the ageing bulk water pipeline between the Orab boreholes and Gibeon settlement. The current infrastructure suffers from frequent breakages and is unable to reliably meet growing demand. Upgrading the scheme will improve the efficiency, resilience, and reliability of water supply to the Gibeon Constituency in the Hardap Region.

This ESIA was undertaken to identify and assess the potential environmental and social impacts of the Project during planning, construction, operation, and possible decommissioning. It has been prepared in line with Namibia's Environmental Management Act (No. 7 of 2007) and the EIA Regulations (GN No. 30 of 2012), and is further guided by international best practice, including the IFC Performance Standards and the Equator Principles. The findings provide MEFT and other stakeholders with sufficient information to support informed decision-making on the Environmental Clearance Certificate (ECC) application.

1.2 PROJECT BACKGROUND

Gibeon is a village in the Gibeon Constituency of the Hardap Region (Figure 1), located in central-southern Namibia. It lies to the west of the B1 national road, approximately 72 km south of Mariental and 176 km north of Keetmanshoop. Owing to its strategic location along the B1 corridor, Gibeon serves as an important rural settlement with access to regional transport routes, while also supporting surrounding communities within the constituency.

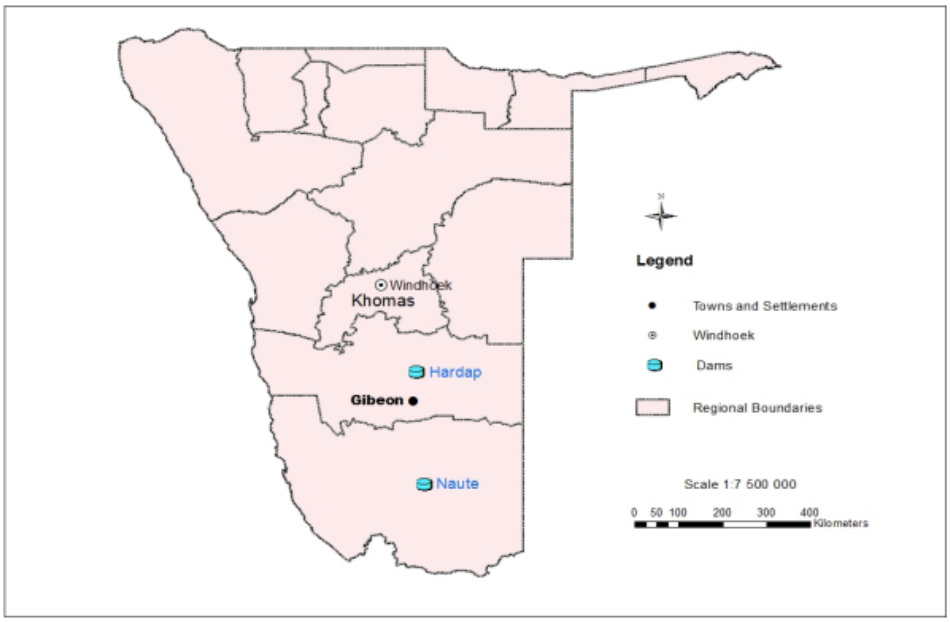

Figure 1: Gibeon Location Map (NamWater, 2023)

The Gibeon Water Supply Scheme is sustained by production boreholes, a 53.3 km bulk pipeline, and a terminal reservoir that supplies both the settlement and the surrounding consumers. Water reaches the settlement through gravitational flow from the terminal concrete reservoir into the village distribution system. As there is no electrical power supply at the reservoir site, the telemetry communication equipment is powered by solar energy. A schematic layout of the Gibeon Scheme is shown in Figure 2.

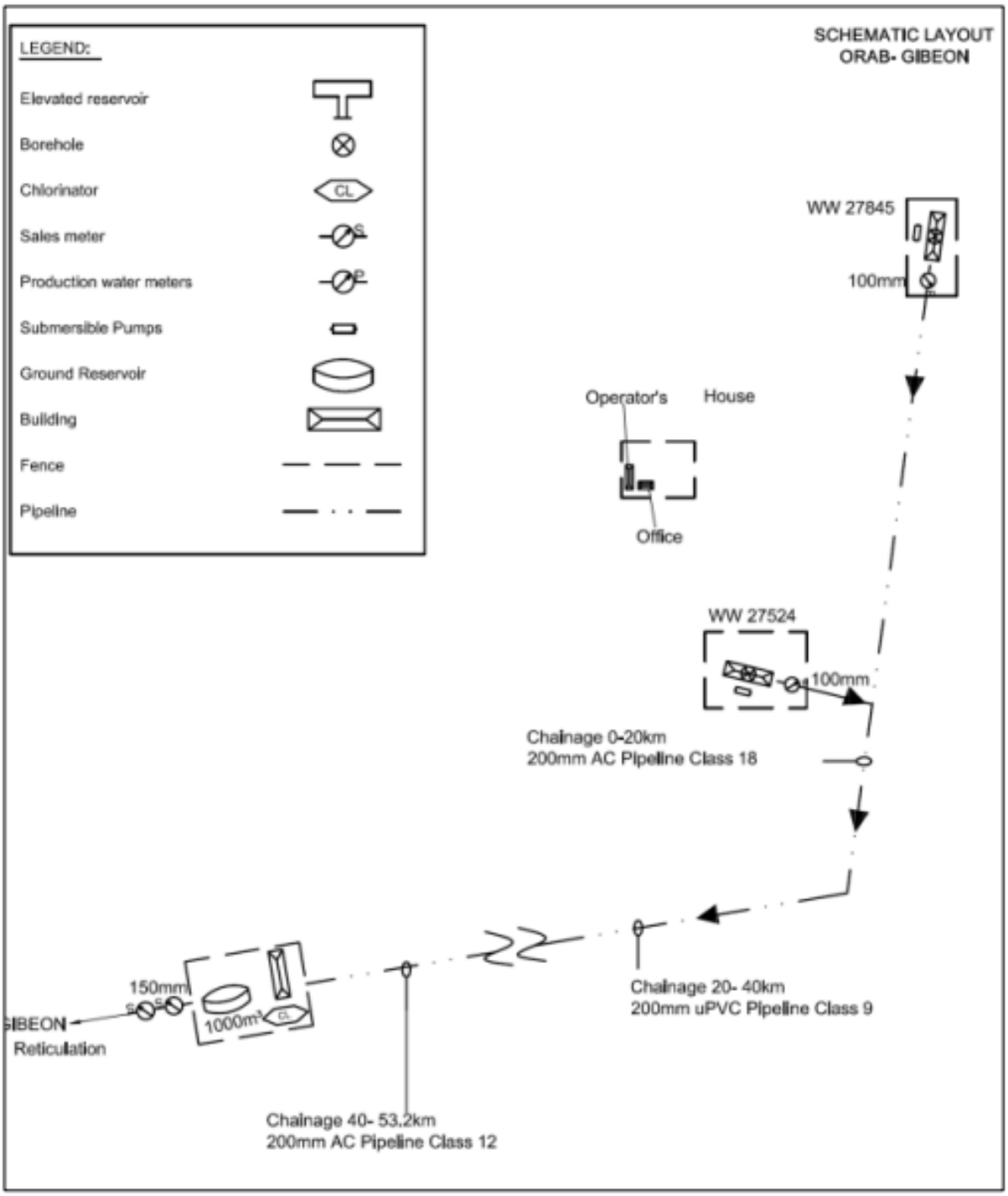

Figure 2: Schematic Layout of the Gibeon Scheme (NamWater, 2023)

1.3 TERMS OF REFERENCE

Considering the need to undertake the proposed project LANA Consultancy cc (hereafter LANA Environmental Assessment Practitioner (EAP)) was appointed by NamWater to undertake an environmental and social impact assessment (ESIA) to apply for an Environmental Clearance Certificate (ECC) for the Construction of the Replacement Pipeline for the Gibeon Water Supply Scheme (hereafter referred to as the Gibeon Upgrade Project).

The scope of work for the ESIA to be conducted specified the Request for Consultancy Services to Conduct an Environmental and Social Impact Assessment and Compilation of an Environmental and Social Management Plan for the construction, operation, maintenance and decommissioning of the proposed Gibeon Upgrade Project as presented in Section 9 of the Bid Documentation (Procurement Reference Number: SC/RP/NW-001/2026) provided by the Proponent. The relevant requirements presented in the Terms of Reference (ToR) are as follows:

The study should be undertaken in three linked phases:

- Phase 1: Scoping
- Phase 2: Detailed Environmental and Social Impact Assessment (DESIA) Report (if required) and
- Phase 3: Environmental and Social Management Plan (ESMP)

It is the opinion of NamWater and the EAP that sufficient information is available to complete the study at Scoping phase and then proceed with the compilation of the environmental and social management plan (ESMP).

1.4 APPROACH AND METHODOLOGY OF THE STUDY

This ESIA process was carried out in accordance with provisions for ESIA as prescribed by the Environmental Impact Assessment Regulations (GN. No. 30 of 2012), provided for by Section 56 of the Environmental Management Act (No. 7 of 2007).

The ESIA process is a planning, design and decision-making tool used to inform the relevant authorities and Proponents what the consequences of their decisions will be in biophysical and social terms. It aims to:

- Establish the policy, legal and planning framework.
- Identify potential impacts (positive and negative) associated with the proposed activities.
- Consult potential Interested and Affected Parties (I&APs) and relevant stakeholders to solicit inputs.
- Produce reports which will enable decision makers to decide whether to proceed with the project as anticipated and if so, what the implications of mitigation are likely to be.
- Compile an ESMP which will indicate how mitigation measures would be implemented to avoid or minimize negative impacts, and to enhance positive impacts while promoting compliance with the principles of environmental management.

The steps followed, as part of this ESIA process are, the registration of the application and execution of the Scoping Phase (content of this Report). A flowchart indicating the process being followed is presented in Figure 3 below.

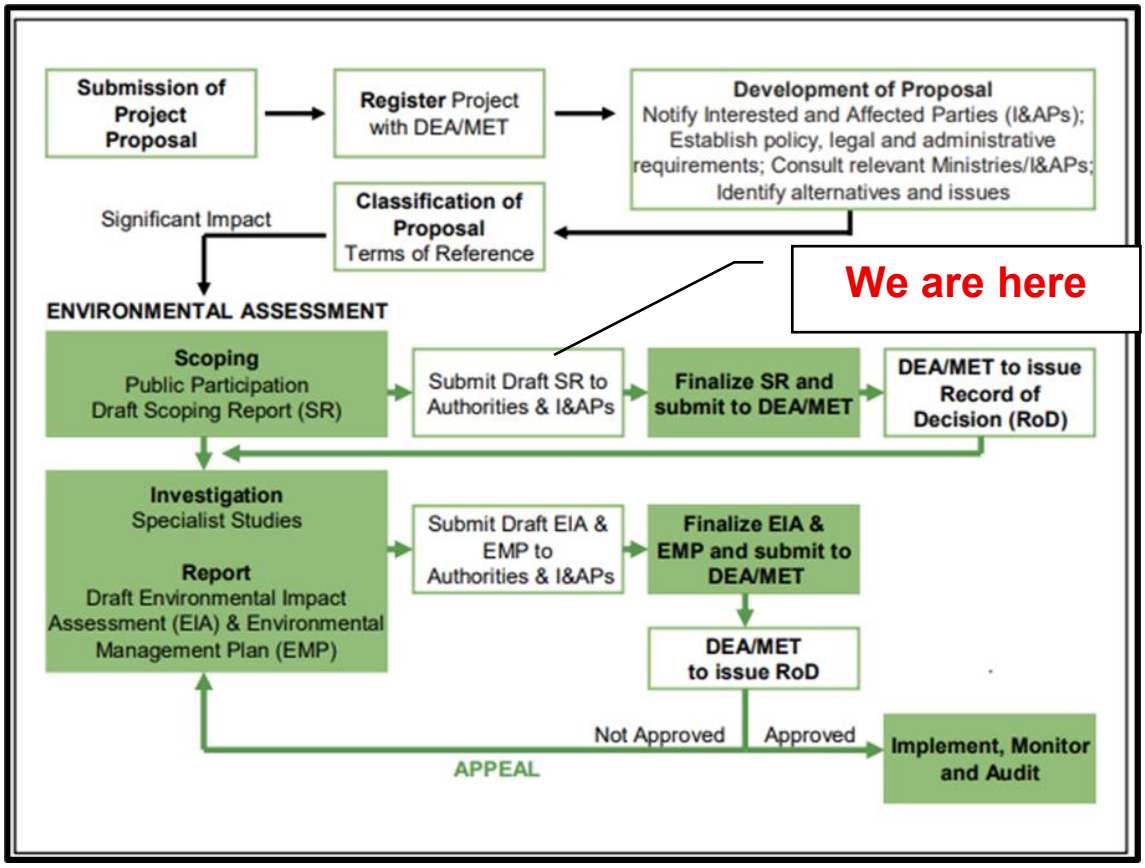

Figure 3: Diagrammatic representation of Namibia's Environmental Assessment process

1.4.1 Environmental Requirements

The first step in the ESIA process was to identify the listed activities triggered by the proposed Project, as set out in the List of Activities that may not be undertaken without an Environmental Clearance Certificate (GN No. 29 of 2012). The relevant listed activity is:

- **Infrastructure: No. 10.1 – The construction of (a) oil, water, gas, petrochemical and other bulk supply pipelines.**

As such, an application for an ECC can only be made once an ESIA study has been undertaken and approved by the competent Authority, namely the Ministry of Environment, Forestry and Tourism (MEFT).

Considering the above, it is therefore required that an ECC be obtained from the Environmental Commissioner under Section 27(3) of Namibia's Environmental Management Act (No. 7 of 2007) (hereafter referred to as the EMA) for the proposed Project. In line with this requirement, at least the scoping phase of an ESIA process was undertaken.

An application for an ECC was subsequently submitted on 06 November 2025 to the MEFT EIA Portal (Application Reference: APP–251106006619) as prescribed under Regulation 6 of the EIA Regulations (GN No. 30 of 2012), read in conjunction with Section 56 of the EMA (No. 7 of 2007).

1.5 SCOPING PHASE OF THE ESIA PROCESS

The next step followed as part of this ESIA process was the scoping stage. The identification of impacts and their significance as well as public consultation (as prescribed by Regulation 21 to 24 of the EIA Regulations (GN. No. 30 of 2012) are important elements of the scoping stage. Hence, during the scoping stage issues/impacts that are likely to be significant are identified and those that are less significant are evaluated and if warranted, eliminated.

This stage, which began in September 2025, set out to -

- Collect baseline information and professional/public opinion concerning the proposed project and the receiving environment (i.e., social and natural environments).
- Determine how and to what extent the proposed project may affect the biophysical and social environment.
- Establish the need and desirability of the proposed Project.
- Compare the advantages and disadvantages of feasible alternatives.
- Highlight the potential significant effects that are likely to be of most importance and to develop or recommend mitigation measures.
- Produce reports which will enable decision makers to decide whether to proceed with the project as anticipated and if so, what the implications of mitigation are likely to be.
- Compile an ESMP which will indicate how mitigation measures would be implemented to avoid or minimize negative impacts, and to enhance positive impacts while promoting compliance with the principles of environmental management.
- Advise on any further studies to be conducted (if any) and provide appropriate Terms of Reference for these.

1.5.1 Methodology for Scoping

The method followed during the scoping stage was under the Environmental Impact Assessment Regulations (GN. No. 30 of 2012), which included – Scoping is the initial phase of the ESIA process, and it refers to the process of determining the spatial and temporal boundaries for the ESIA. In broad terms, this involves these important activities:

- Giving notice to all potential interested and affected parties of the application (ECC);
- Public consultation as per Regulation 21 which included the –
    - Opening and maintaining a register of all Interested and Affected Parties (I&APs); and
    - Receiving and recording of all comments and representations received from I&APs following the public consultation processes.
- Preparing a scoping report by subjecting the proposed application to scoping by -
    - Confirming the process to be followed and providing opportunities for stakeholder engagement.
    - Identifying the key issues to be addressed and the approach to be followed in addressing these issues during the impact assessment phase.
    - Identifying any specialist studies which need to be undertaken and the terms of reference to be followed when undertaking them.
    - Informing all I&APs of the way forward

    - Providing all information to the relevant making decision-making authority, thus ensuring accountable and transparent decision-making.
    - Inviting all registered I&APs to comment on the scoping report.
    - Presenting the record of decision to I&APs for objections and comments.
- All registered I&APs will be notified of the availability of the draft scoping report for review and comment.
- A detailed explanation of the activities undertaken to consult potential I&APs is presented in Section 6 of this report.

1.5.1.1 Collection of baseline information

Baseline information about the proposed development area, the receiving environment, and the proposed activities was obtained from personal observations, interviews with the NamWater Business Unit: South staff members, a review of existing information, and contributions from stakeholders, relevant authorities, and I&APs. The process that was followed is explained in detail below:

(i) Site visits

The initial site visit was conducted from 22 – 24 September 2025. During this visit, the EAP was guided through the project area and provided with a detailed overview of the existing infrastructure, which includes the collector reservoir, chlorine room, pump rooms, existing pipeline, and boreholes, as well as the overall water supply process. The EAP was also briefed on the functioning of the current water supply scheme.

As part of the assessment, baseline information on the site's biophysical and social environment was collected, with a focus on locally occurring flora and fauna, adjacent land uses, and terrain and landscape formations. In addition, a line survey was conducted along the existing pipeline corridor, covering the section from boreholes BH 29114 to BH 29115 (at Farm Orab) through to the ground collector reservoir in Gibeon (Figure 4).

The information gathered during the site visit—including details on terrain, biodiversity, and land uses—is presented in Sections 5, 6, and 7 of this report.

Figure 4: View of the site visit and line survey

(ii) Review of existing information

The Scoping process also benefited a great deal from existing relevant information such as:

- Preliminary Design Draft Report. Gibeon Upgrade. NamWater Civil Engineering. June 2023.
- Situation Assessment and Water Demand Analysis for Orab Gibeon Water Supply Scheme. NamWater Infrastructure Planning. October 2018
- Namibia 2023 Population-and-Housing-Census-Main-Report

Other information was sources from key stakeholders such as Gibeon village Council, Rural Water Supply, Chairpersons of resettlement farms and residents of Gibeon Village.

1.6 PURPOSE OF THIS SCOPING REPORT

The objectives of this report are to:

- Provide the competent authority and the regulatory authority with a comprehensive account of the ESIA process, findings, and input from I&APs, stakeholders, and commenting authorities who have participated in this ESIA.
- Provide details of the applicable legislative framework to ensure that the proposed work is undertaken in an environmentally responsible manner; and
- Recommend methods to minimise the identified negative impacts (identified throughout the project life cycle) and its associated infrastructure and enhance the positive impacts to acquire the required ECC to proceed with the listed activity.

1.7 ASSUMPTIONS, LIMITATIONS AND CONSTRAINTS

In undertaking this ESIA and compiling the scoping report, the following assumptions and limitations were applied:

- It is assumed that all information provided by the Proponent, project team, and consulted authorities is accurate, and that all relevant details have been disclosed.
- All permit and licence requirements (other than the ECC) associated with this Project will be addressed through separate investigations and processes; they are not covered under this ESIA.
- No significant changes to the proposed Project or the receiving environment are anticipated between the compilation of this report and project implementation that could substantially alter findings or mitigation recommendations.
- The assessment considers the current conservation value of the affected land, and not its historic or potential future conservation value.
- The ESIA is based on the prevailing environmental (biophysical and social) and legislative context at the time of writing.
- Field surveys were time-bound and limited in scope; therefore, seasonal variations in flora, fauna, or hydrology may not have been fully captured.

Disclaimer: Any substantial changes in project design, scope, or the environmental baseline may require a reassessment of the impacts and corresponding mitigation measures.

1.8 ENVIRONMENTAL ASSESSMENT PROJECT TEAM

LANA Consultancy is an independent firm of consultants appointed by NamWater to carry out the ESIA and to compile an ESMP, which would be used to apply for an ECC for the construction, operation, maintenance and decommissioning of the proposed Gibeon Upgrade Project.

The ESIA project team is outlined in Table 1. Nangula Amutenya (CV attached as Appendix A) is the lead EAP who conducted this ESIA process, assisted by Rauna Nghifikua and Faye Brinkman.

Table 1: ESIA Team

Name	Company and Role	Email address
Jolanda Kamburona	NamWater *Acting Manager* *Environmental Services*	KamburonaJ@namwater.com.na
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Rauna Nghifikua	Lana Consultancy *EAP*	getrauna@gmail.com
Faye Brinkman	Lana Consultancy Assistant EAP	brinkmann.faye@gmail.com

This ESIA has been prepared in accordance with the provisions of the Environmental Management Act (No. 7 of 2007) and the accompanying EIA Regulations (GN No. 30 of 2012) to ensure that the proposed Gibeon Upgrade Project complies with national environmental legislation and regulatory requirements. Furthermore, the assessment has been guided by internationally recognised best practice standards, including the International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability and the Equator Principles, to enhance environmental and social risk management and ensure alignment with global safeguards.

1.9 OVERVIEW OF THE REPORT STRUCTURE

The rest of the report is structured as follows:

- **Chapter 2** – Description of the Gibeon Water Supply Scheme and alternatives considered.
- **Chapter 3** – Proposed scope of works and project design.
- **Chapter 4** – Stakeholder engagement and public consultation process.
- **Chapter 5** – Description of the affected environment (biophysical and socio-economic baseline).
- **Chapter 6** – Resource requirements of the Project.
- **Chapter 7** – Environmental and social impact assessment and proposed mitigation measures.
- **Chapter 8** – Cumulative impacts, conclusions, and recommendations

2 DESCRIPTION OF THE GIBEON WATER SUPPLY SCHEME

This chapter provides an overview of the existing Gibeon Water Supply Scheme and outlines the proposed upgrade works. It also presents the reasonable alternatives that were considered during project planning as part of this ESIA process. The information in this chapter is based primarily on secondary data supplied by the Proponent, supplemented where necessary by site inspections and technical reports.

2.1 PROJECT LOCATION

The project area encompasses all affected sections along the existing and proposed pipeline route alignments within the designated servitude between Orab and Gibeon.

Both the existing and proposed alignments traverse the south-central part of the Hardap Region. The proposed new pipeline will be laid parallel to the existing one, within the same servitude corridor, to minimize additional land disturbance.

The project area includes land under the Gibeon Village Council, as well as communal and commercial properties situated along the existing and proposed pipeline route between Farm Orab and Gibeon.

2.2 EXISTING INFRASTRUCTURE

The existing infrastructure of the current Gibeon Scheme and their functions is explained in the sections below.

2.2.1 Water Source

The Gibeon settlement is currently supplied through the Orab–Gibeon bulk pipeline as part of the Gibeon Water Supply Scheme, operated by NamWater Business Unit South. The town of Gibeon as well as the nearby farms rely on ground water extracted from the fractured aquifer of the Nama sediments. Figure 5 below illustrates the groundwater potential of rock bodies across Namibia. The Gibeon settlement and surrounding farms fall within the fractured aquifers of the Nama sediments, which are classified as having moderate to high groundwater potential (Atlas of Namibia Team, 2022). This corresponds with the current reliance of the Gibeon Water Supply Scheme on groundwater abstraction for bulk supply.

2.3 BOREHOLES

Water for the scheme is abstracted from two strong production boreholes (WW27524 and WW27845) located at Farm Orab, approximately 50 km north of Gibeon. Each borehole has a yield capacity of 80 m^3/hr. All boreholes are electrically powered with power supply from NamPower transformer. Power is transmitted through a secondary power line which supplies electricity to the switchboard at the pump-station and to the boreholes. The flow levels of all boreholes and the reservoir are controlled through the telemetry system.

Figure 6 shows a pictorial highlight of the existing infrastructure at Farm Orab.

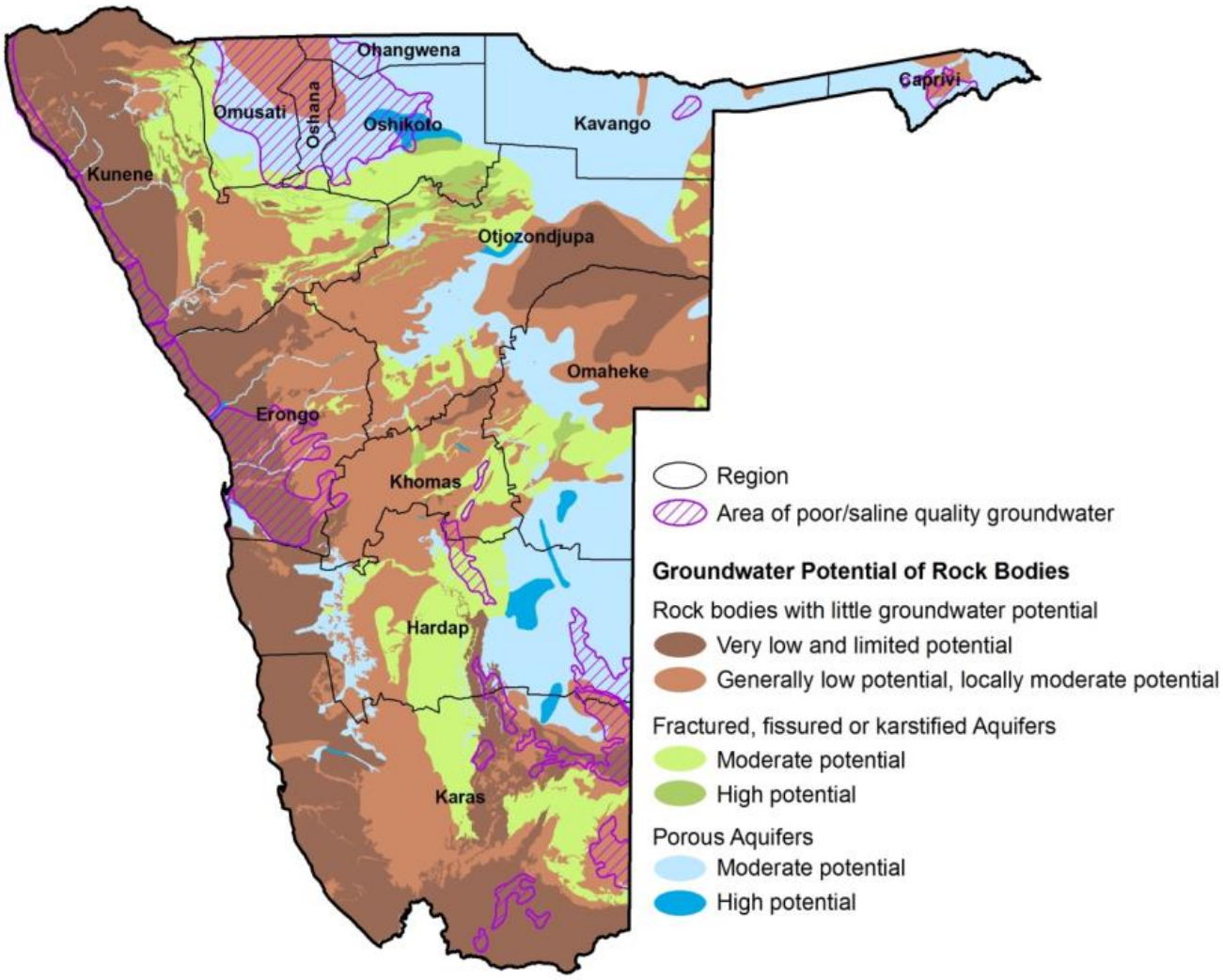


Figure 5: Groundwater potential of rock bodies in Namibia, showing the distribution of porous and fractured aquifers.

Figure 6: Existing infrastructure at Farm Orab, including borehole pump houses, power supply installations, control panels (Siemens SCADA system), telemetry equipment, and operator facilities that form part of the Orab–Gibeon Water Supply Scheme.

2.3.1 Pipelines

Water from the boreholes is conveyed through a 53 km long bulk pipeline with a 200 mm diameter, comprising both asbestos cement (AC) and uPVC sections:

- The first 20 km consists of a class 18 AC pipeline.
- The next 20 km is a class 9 uPVC pipeline.
- The remaining 13 km is a class 12 AC pipeline.

2.3.2 Reservoir

Raw water is pumped from the boreholes through the pipelines to the to the settlement's terminal reservoir at the NamWater premises. The rest of the facilities on the premises (Figure 7) include:

Bulk Water Meter Chamber (Gibeon Settlement)

- Bulk water meter chamber housing the primary meter assembly and isolation valves, which monitor and regulate the inflow of potable water into the Gibeon settlement distribution system.

Secondary Meter Installation (Gibeon Supply Line)

- Protective steel cage enclosing secondary meters and fittings along the Gibeon water supply line, designed to prevent vandalism and maintain operational integrity.

Ground-Level Reservoir

- Reinforced concrete reservoir providing bulk storage capacity of 1,000 m³ for Gibeon, situated alongside the bulk meter chamber controlling inflows from the transmission pipeline.
- The reservoir is equipped with inflow, outflow, scour and overflow pipework, as well as an access ladder and safety features.

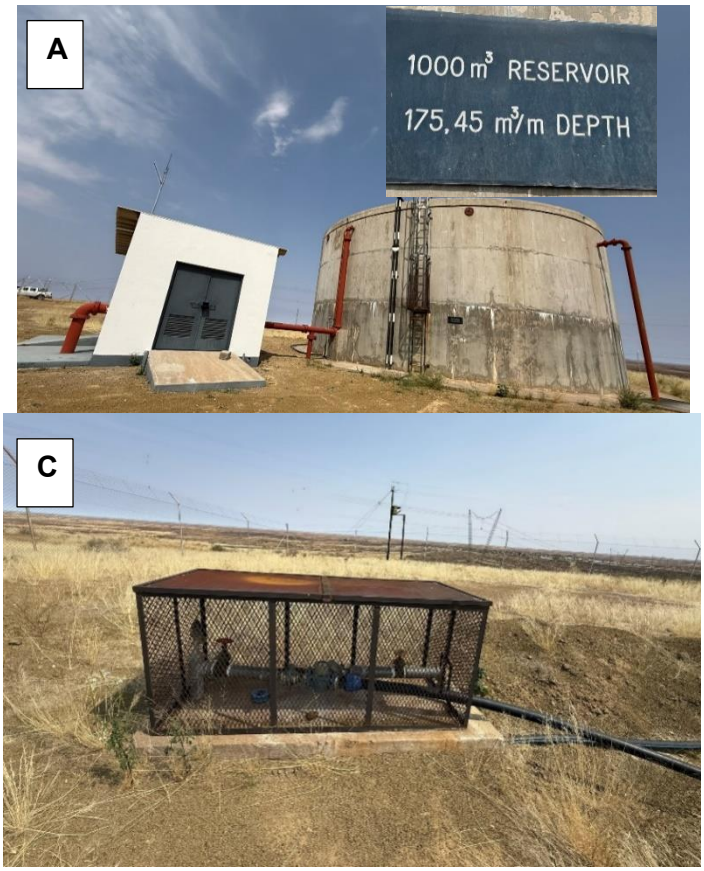


Figure 7: A - 1,000 m³ reinforced concrete reservoir with adjacent bulk meter chamber., B- Bulk water meter chamber supplying Gibeon settlement., C - Secondary meter installation along Gibeon supply line (protected cage)

2.3.3 Water Quality and Disinfection

At the reservoir, disinfection is achieved through gas chlorination, which provides effective microbial control and compliance with national drinking water quality standards. This process ensures the continuous supply of safe potable water to schools, households, public institutions, hostels, and businesses.

According to NamWater (2023), the production boreholes within the Orab–Gibeon Water Supply Scheme yield groundwater of generally acceptable quality, requiring only limited treatment to meet potable water standards. The raw water is disinfected through gas chlorination, which is carried out by an advanced chlorination system located in a dedicated building at the ground-level reservoir site.

In accordance with the Water Resources Management Act, 2013 (Act No. 11 of 2013) and the Water Resources Management Regulations, 2023 (Government Notice No. 269 of 2023), water treatment activities must comply with Regulation 6 (evaluation and approval of treatment processes), Regulation 7 (requirements for operation of treatment facilities), and the Water Quality Guidelines and Standards for Potable Water specified in Annexure 1 of the Regulations. These provisions ensure that the treatment process maintains the safety and quality of water supplied to the Gibeon settlement.

Chlorine Cylinder Room

- A well-ventilated, secure building for housing cylinders and dosing equipment.
- Doors kept locked, with safety signage

Chlorine Gas Cylinders

- Contain compressed chlorine gas (68 kg cylinders).
- Stored upright and secured to prevent accidents.

Injector / Ejector System

- Mixes chlorine gas with water under vacuum conditions.
- Ensures the gas dissolves effectively before entering the main water line.

Control Panel & Monitoring Instruments

- For adjusting chlorine dosage.
- Include automatic residual chlorine analysers for feedback control.

Piping & Valves

- Corrosion-resistant pipelines and valves connecting cylinders to chlorinators.
- Non-return valves to prevent backflow of water into the gas line.

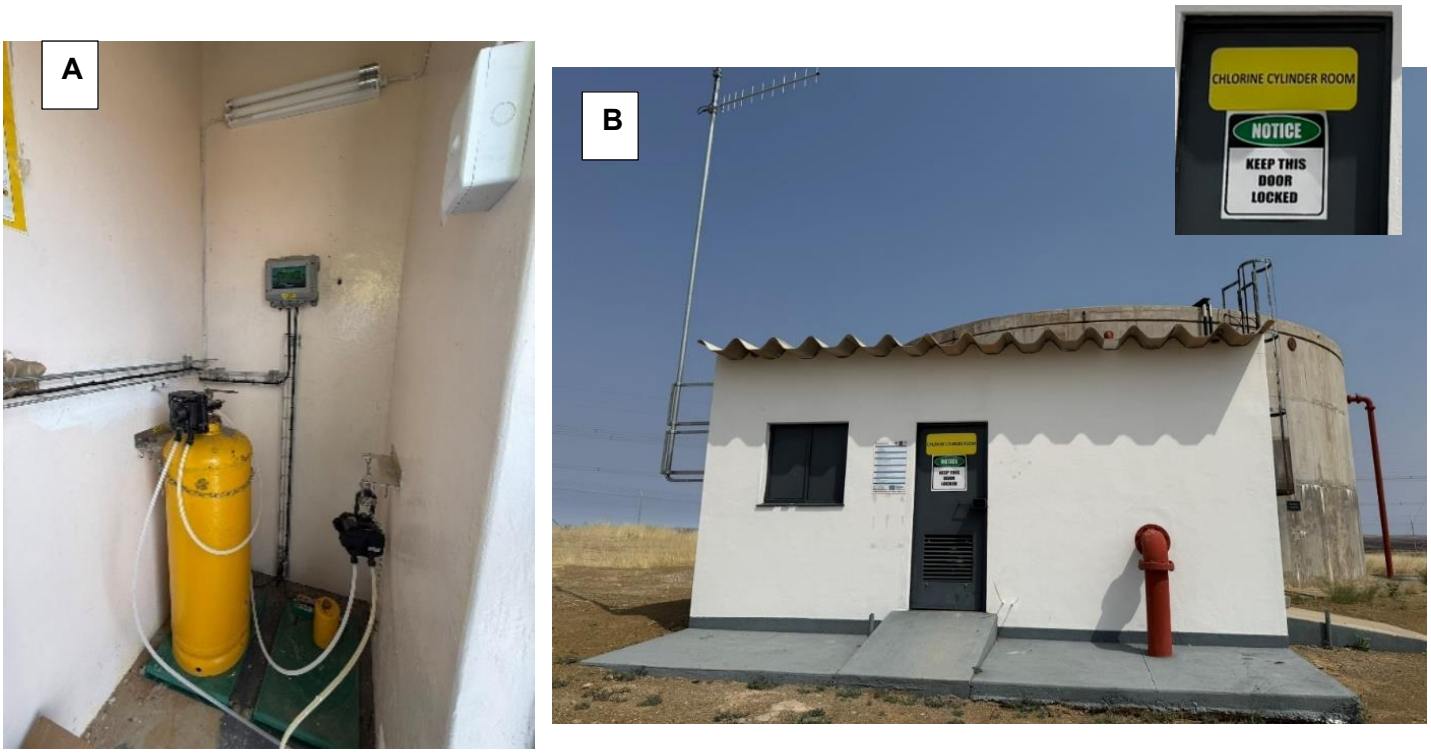


Figure 8: A - gas chlorination unit installed at the reservoir, B – Chlorine cylinder room

2.4 NEED AND DESIRABILITY OF THE PROJECT

The Civil Preliminary Design Report for the Gibeon Upgrade Project (2023), prepared by the NamWater Civil Engineering Team, identified a number of technical challenges within the existing water supply infrastructure. These highlight the necessity of the proposed upgrade:

Adequate Borehole Capacity

- The two existing production boreholes, BH27524 and BH27845, each yield approximately 80 m³/hr. This combined yield is sufficient to meet current and future demand, confirming that water availability from the source is not a limiting factor for the scheme.

Pipeline Performance

- Between May 2021 and May 2023, records indicate 146 incidents of pipe bursts and leakages along the main pipeline. Such failures have disrupted water supply and increased maintenance requirements, pointing to the need for a more reliable system.

Air Valve Functionality

- Several offtakes have been connected to existing air valves. This practice may have limited the effectiveness of the valves, reducing their ability to maintain hydraulic efficiency and potentially contributing to pressure-related failures.

Condition of Asbestos Cement (AC) Pipeline Sections

- The AC pipeline sections covering Chainage 0–20 km and 40–53.3 km show significant deterioration due to age. These sections are no longer structurally reliable and require replacement.

Condition of uPVC Pipeline Sections

- The uPVC section between Chainage 20–40 km has experienced repeated bursts and leakages. The frequency of these incidents indicates that full replacement is the most viable solution.

While the groundwater supply capacity is adequate, the ageing and deteriorating pipeline infrastructure has reduced the reliability and efficiency of the scheme. The proposed Gibeon Upgrade Project will address these technical challenges through targeted replacement of pipeline sections and restoration of hydraulic controls. This intervention will ensure a more dependable, sustainable, and safe water supply for households, schools, hostels, businesses, public institutions, resettled communal farmers, and commercial farmers in Gibeon and its surroundings.

3 PROPOSED SCOPE OF WORKS AND ALTERNATIVES

This chapter outlines the proposed Gibeon Upgrade Project, including a description of the planned scope of works and consideration of reasonable alternatives. The chapter provides details on the phased implementation approach, the system upgrades, and the proposed pipeline replacement. It also considers design alternatives, such as above-ground versus buried pipeline installation, to ensure that the most practical, technically sound, and environmentally responsible solution is adopted.

The content presented herein is based on secondary information provided by the Proponent, including the Civil Preliminary Design Report prepared by the NamWater Civil Engineering Team (2023).

3.1 PROPOSED SCOPE OF WORKS (SCHEME UPGRADE)

The Gibeon Upgrade Project will be completed in phases, starting with the most critical sections due to the expected high capital cost. The Project was divided into two phases as follows:

Phase 1: System Upgrade & Automation

- **Control System Replacement:** The existing control system will be replaced with an automated telemetry system, linked between the terminal reservoir and the boreholes, and integrated with the NamWater SCADA system.
- **Variable Speed Drives (VSDs):** At least one, and potentially both, submersible motors will be equipped with a Variable Speed Drive (VSD). This will enable continuous low-flow operation, thereby preventing air from entering the pipeline during periods of low demand.
- **Flow Measurement:** Flowmeters will be installed at the boreholes, as well as inflow and outflow meters at the terminal reservoir. These will be connected to the upgraded telemetry system, improving the ability to detect pipeline breaks and leakages in real time, while also facilitating accurate water balance calculations for the 53.3 km pipeline.

Phase 2: Pipeline Replacement

- Full replacement of the existing 53.3 km pipeline is proposed.

3.1.1 Pipeline Route (BH 29114 To BH 29115 To Collector Reservoir)

The proposed pipeline route traverses farmland, where human activity along the existing service road is limited. The alignment of the new pipeline will largely follow the route of the existing line but will be positioned approximately 3–5 metres away.

This approach will enable NamWater to continue utilising the existing service farm track and servitude during both the installation and the long-term maintenance of the new pipeline. Importantly, the pipeline will be placed within the servitude already registered over the project

area, which is legally recognised and enforceable. Figure 9 provides a Google Earth image highlighting the pipeline route and the corresponding chainages.

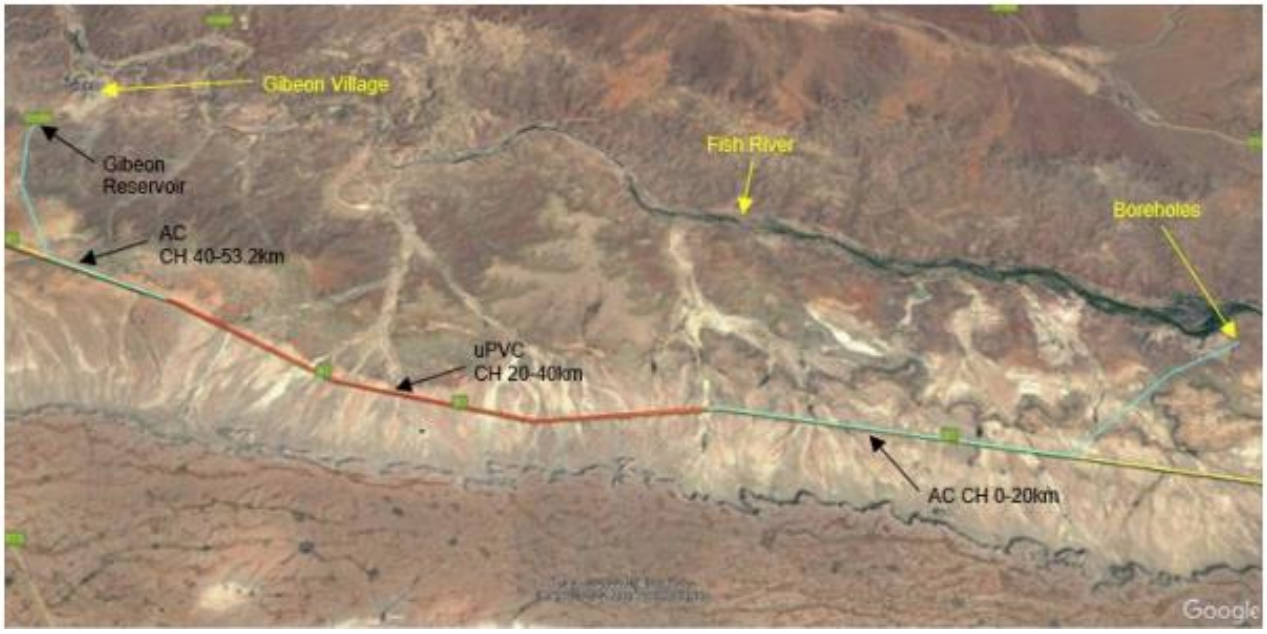


Figure 9: Pipeline Route (NamWater, 2023)

Figure 10: Scenic view along the route

3.1.2 Above-Ground vs Buried Pipeline

The entire existing pipeline from the boreholes to the Gibeon Reservoir is located below ground and will be left in situ. This approach will prevent disturbance to the current water supply during construction and minimise environmental impacts.

Inspections undertaken by the NamWater Engineering Team in 2023 and subsequently by the EAP in September 2025 confirmed that soil conditions along the pipeline route consist mainly

of soft to intermediate material. On this basis, the new 53.3 km replacement pipeline will also be installed below ground, running parallel to the existing line.

3.2 PROJECTED WATER DEMAND

A scheme sufficiency analysis was conducted by the Infrastructure Planning Division of NamWater, the results of which are presented in Table 2.

Table 2: Gibeon Scheme Sufficiency Analysis (NamWater, 2023)

Scheme Component	Existing Capacity	Required FY 2018	Surplus FY 2018	Required FY 2035	Surplus FY 2035
Boreholes (m^3/day)	1,600	714	886	846	754
Borehole Pumps (m^3/day)	1,800	714	1,086	846	954
Pipeline (m^3/day)	1,886	714	1,172	846	1,040
Reservoir (m^3)	1,000	916	84	1,084	-84

As per Table 2 above, the 2035 future demand of 846 m^3/day is well within the capacities of the existing boreholes, borehole pumps and the bulk water pipeline. The only identified shortfall relates to reservoir storage capacity, where the current 48-hour storage of 1,000 m^3 shows a marginal deficit of 84 m^3 against the projected demand. This will require augmentation before 2035.

According to the M&E Preliminary Design Report (April 2019), a production volume of 1,200 m^3/day (equivalent to 50 m^3/hr for 16 hours per day) has been adopted to meet both current and future requirements. Accordingly, 50 m^3/hr has been confirmed as the design flow for the scheme.

In addition, the NamWater Infrastructure Planning Division has projected the FY 2038 demand at 1,007 m^3/day, which remains within the production capacity of the boreholes and associated pumping equipment, though with a tighter margin than in 2035.

3.3 PROJECT DESIGN

3.3.1 Pipe Material Selection

The preliminary design considered a range of pipe materials, namely High-Density Polyethylene (HDPE), Unplasticized Polyvinyl Chloride (uPVC) and Modified Polyvinyl Chloride (M-PVC), for each section of the pipeline. These options were evaluated based on cost, durability, ease of installation and previous performance on NamWater schemes.

- **Chainage 0–20 km**
    - DN200 HDPE Class 12
    - DN200 uPVC Class 12
    - DN200 M-PVC Class 12
- **Chainage 20–40 km**
    - DN200 HDPE Class 10
    - DN200 uPVC Class 9
    - DN200 M-PVC Class 12
- **Chainage 40–53.2 km**
    - DN160 HDPE Class 10
    - DN160 uPVC Class 9
    - DN160 M-PVC Class 9

Following evaluation, M-PVC was selected as the preferred material for all three sections. This choice reflects its proven performance in NamWater projects, adequate pressure ratings, and competitive pricing compared to HDPE and uPVC. M-PVC is also more widely available locally and requires less specialised installation than HDPE, thereby reducing both procurement and construction costs (NamWater, 2023).

- **Design Life**

M-PVC pipelines typically provide a service life of 30–50 years under normal operating conditions, subject to proper installation and maintenance. This makes it a sustainable and cost-effective choice for the Gibeon Upgrade Project.

- **Operational Pressures**

The selected pressure classes—Class 12 for the first 40 km and Class 9 for the final 13.2 km—correspond to maximum operating pressures of approximately 12 bar and 9 bar respectively. Hydraulic modelling confirmed that these ratings are sufficient to withstand static head, dynamic head and water hammer conditions expected along the route (NamWater, 2023).

- **Alternatives Considered – Pipe Material**

HDPE and uPVC were assessed but not selected. Although technically suitable, HDPE was considered costlier and required specialised welding, while uPVC was more expensive than

M-PVC for equivalent pressure classes (NamWater, 2023). M-PVC therefore represents the most cost-effective, technically robust and sustainable solution.

3.3.1 Pipe Diameter Selection

Hydraulic modelling was undertaken to ensure velocities between 0.6 and 1.2 m/s, in accordance with design guidelines (NamWater, 2023). The diameters adopted in the preliminary design are presented in Table 3.

Table 3: Nominal diameters for the pipeline

Chainage	Pipe Diameter	Pipe Material	Pipe Class
0 km – 20 km	DN200 M-PVC	M-PVC	Class 12
20 km – 40 km	DN200 M-PVC	M-PVC	Class 12
40 km – 53.2 km	DN160 M-PVC	M-PVC	Class 9

- **Justification**

The DN200 diameter for the first 40 km ensures sufficient capacity at the design flow of 50 m³/hr while maintaining optimal flow velocities and minimising head losses. The final DN160 section was selected on hydraulic grounds, as the shorter distance and reduced head losses permit a smaller diameter without compromising system performance.

- **Alternatives Considered – Pipe Diameter/Pressure Class**

Larger diameters and higher-pressure classes were reviewed but determined to be unnecessary. Oversizing would have increased costs significantly without delivering technical or operational benefits. The adopted diameters and pressure ratings therefore provide the most cost-effective and technically appropriate solution in line with NamWater's design standards (NamWater, 2023).

3.3.2 Summary of Design Rationale

In summary, the pipeline design for the Gibeon Upgrade Project reflects a balance between technical adequacy, long-term sustainability and cost-effectiveness. The adoption of M-PVC as the preferred material ensures durability, affordability and proven performance under NamWater operating conditions. The selected diameters of DN200 for the first 40 km and DN160 for the final 13.2 km, combined with pressure ratings of Class 12 and Class 9, have been confirmed through hydraulic modelling to provide sufficient capacity, acceptable velocities and resilience against pressure surges.

Alternative pipe materials and larger diameters were considered but were not pursued, as they would have increased project costs without offering additional operational benefits. The proposed design therefore represents the most practical, efficient and sustainable solution for securing the long-term reliability of the Gibeon water supply scheme (NamWater, 2023).

The diagram in Figure 11 illustrates the pipeline alignment from the production boreholes (BH27524 and BH27845) to the Gibeon Reservoir, showing the selected pipe diameters, materials, and pressure classes for each chainage section.

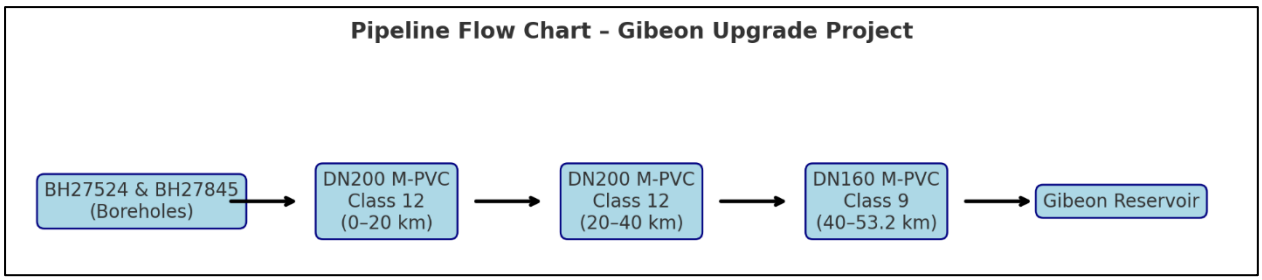


Figure 11: Schematic flow chart of the proposed pipeline design for the Gibeon Upgrade Project.

3.3.3 Consideration of Alternatives

In line with ESIA best practice and EIA regulations, both design alternatives (above-ground and underground pipeline configurations) and the No-Project Alternative were evaluated. Each option was assessed in terms of its technical feasibility, environmental and social impacts, and long-term sustainability. The comparative assessment is presented in Table 4 below.

Table 4: Comparative assessment of alternatives

Alternative	Advantages	Disadvantages	Overall Assessment
Alternative 1: Above-Ground Pipeline	• Easier and quicker leak detection. • No soil pressure on pipeline.	• Significant visual impact on residents and tourists. • Restricts movement of people, livestock and wildlife, creating socio-economic impacts. • Susceptible to sun and weathering, reducing design life.	Not preferred – socio-economic and environmental impacts outweigh benefits.
Alternative 2: Underground Pipeline	• No visual impact. • Does not restrict movement of people, livestock or wildlife. • Protected from weathering and UV radiation, extending service life.	Leak detection slower and more complex.	**Preferred – impacts are minimal and can be mitigated through telemetry and monitoring systems.**
Alternative 3: No-Project Scenario	No immediate capital investment required.	• Continued frequent pipeline failures (146 breaks recorded 2021–2023). • Escalating maintenance costs.	Not viable – results in further deterioration of the system and reduced supply reliability.

Alternative	Advantages	Disadvantages	Overall Assessment
		• Unreliable water supply for households, institutions and farmers. • Long-term public health and socio-economic risks.	

3.4 CONSTRUCTION PHASE

The construction period, excluding the tender adjudication stage, will be approximately 12 months, from site establishment to site rehabilitation.

Typical construction activities will include:

- **Transportation** of large volumes of construction materials and labourers;
- **Excavations and earthworks** (e.g., trench digging) using machinery and/or manual methods to prepare the area for pipeline laying;
- **Assembly and placement of pipe segments** using appropriate machinery;
- **Pipeline testing** prior to commissioning;
- **Rehabilitation** of disturbed areas once construction is complete.

Construction at this scale will require a relatively small labour force. The exact workforce numbers are not yet known, but it is expected that non-local workers will be accommodated either in Gibeon or Mariental, while local labour will be prioritised where possible.

3.5 OPERATIONAL PHASE

During the operational phase, the following activities are anticipated:

- **Clearance of obstructions** along the pipeline servitude to ensure accessibility and protect the integrity of the infrastructure.
- **Regular inspections** of the underground pipeline to check for leaks, illegal off-takes, and other issues.
- **Maintenance and repair activities**, including fixing leaks and addressing defects to minimise water losses and ensure continuous supply.
- **Provision of new water connections** where required, in line with community and farming needs, subject to NamWater approval and capacity.
- **Removal of unauthorised structures** that may be built unknowingly above the underground pipeline alignment, in order to maintain the servitude and ensure safety.

3.6 DECOMMISSIONING AND CLOSURE

Decommissioning of the new pipeline is not foreseen during the validity of the ECC. If it becomes necessary in future, a separate ESIA for decommissioning will be required.

Once the new pipeline is commissioned, the existing pipeline will remain in situ. If decommissioning of the old line becomes necessary, a switchover will be carried out without interrupting water supply.

Typical decommissioning methods include:

- Dismantling – physical removal of pipeline components;
- Local decommissioning – pigging, segmenting, plugging, and filling of pipeline sections;
- Abandonment in place – leaving the pipeline underground where it does not pose risks.

This approach will minimise environmental disturbance while ensuring continuity of supply.

3.7 RESOURCE REQUIREMENTS

3.7.1 Source of Construction Materials

The required pipeline materials will consist of M-PVC pipes (DN200 Class 12 and DN160 Class 9). These materials have been successfully used in previous NamWater projects and are considered durable and reliable. Other general construction materials such as sand, gravel, cement, and stone will be sourced locally where possible

3.7.2 Electricity Consumption and Requirements

Electricity supply is already available at the boreholes, where it powers the submersible pumps. As there is currently no electrical power supply at the terminal reservoir site, the telemetry communication equipment is powered by solar energy.

The preliminary design report recommends that electricity supply to the terminal reservoir should be investigated. This will be necessary to power the chlorine dosing pumps and to strengthen security at the reservoir site. Power supply points will be applied for via NamPower. However, details of the power line route are not available at this stage and will need to be determined during detailed design.

3.7.3 Workforce Requirement During Construction

While the exact number of workers is not specified in the preliminary design report, construction of a 53.3 km bulk water pipeline will require a temporary workforce consisting of both skilled and unskilled labour, as well as subcontractors for material supply, transport, and ancillary services.

3.7.4 Workforce Requirement During Operation

The scheme is currently operated by the NamWater Business Unit South under the supervision of the Scheme Superintendent. Operation of the upgraded pipeline will continue under this arrangement, and no additional permanent staff are anticipated beyond existing NamWater personnel.

4 LEGAL AND POLICY FRAMEWORK

To protect the environment and ensure that the development is undertaken in an environmentally and socially responsible manner, several environmental and social legislations need to be adhered to.

Several sectoral laws fall under the general rubric of environmental laws. Sectoral laws are generally specific and apply to sectors such as forestry, water, mining and so forth. Any development, such as the proposed Project, is expected to have certain impacts and would therefore have to comply with some or other legislative requirement/s before commencement.

This chapter provides an overview of the legislation that applies to both the assessment process and the various activities making up the Project. It is accordingly divided into:

a) the legal framework for environmental management in Namibia;
b) national sectoral legislative requirements applicable to the activities of the proposed Project; and
c) other relevant legislation and approvals required for the commencement of the Project.

4.1 NATIONAL LAWS

4.1.1 Environmental management requirements

The proposed activities (construction, operation, maintenance, and decommissioning of the proposed Gibeon Upgrade Project will trigger activities listed under the Environmental Management Act No. 7 of 2007 and the EIA Regulations (No. 03 of February 2012) as follows.

Table 5: The listed project activities

Proposed project activities	Activities triggered	
	Category	Specific activity
Construction of new water pipeline and pipeline replacement	No. 10 Infrastructure	10.1 The Construction of (a) oil, water, gas and petrochemical, and other bulk supply pipelines

4.1.2 Legal Protection of the new pipeline

The proposed new pipeline will be located within the boundaries of an existing registered servitude along the current pipeline route. As such, no new servitude needs to be created; however, the project must comply with the legislative framework governing the registration, recognition, and administration of servitudes in Namibia. The most relevant laws as outline in Table 6

Table 6: Applicable Legislation on Servitude in Namibia

LEGISLATION	PROVISION	PROJECT IMPLICATIONS
Deeds Registries Act No. 14 of 2015	Provides for the registration of title deeds for land parcels and associated survey diagrams, which must be lodged with both the Directorate of Survey and Mapping and the Directorate of Deeds Registration. **Section 29** – Provides for the registration of a right of servitude over any land expropriated by, or vested in, the State, regional authority, local authority, body corporate, or association of persons under any law. **Section 68** – Deals with the creation of praedial servitudes by notarial deed. **Section 69** – Provides conditions relating to the registration of praedial servitudes.	• Confirms that the servitude already registered over the project area is legally recognised and enforceable. • Since the servitude exists, no additional notarial deed or registration process is required, unless amendments are made. • Ensures legal certainty for the placement of the new pipeline within the registered corridor.
Flexible Land Tenure Act No. 4 of 2012	Establishes a new land tenure system for land in urban and settlement areas, supplementing existing forms of land tenure without replacing them. **Section 10(5)(c)** – Provides for creating or cancelling a right of way in favour of any owner of land holding title rights in any plot within the same scheme. **Section 10(5)(d)** – Provides for creating or cancelling servitudes related to services such as water, electricity, telecommunications, or sewerage removal within a scheme.	• Supports the recognition of servitudes in settlement or urban areas for services such as water pipelines.
Flexible Land Tenure Regulations (May 2018)	Prescribes the manner in which a servitude under Section 10(5) of the Act is registered, cancelled, ceded, or amended (**Regulation 26**).	• The project must adhere to the regulatory provisions should any adjustments to the servitude be required (e.g., widening or altering access). • Provides administrative procedures for registration, amendment, or cancellation if future modifications become necessary.
Communal Land Reform Act No. 5 of 2002	Regulates rights in communal land areas. **Sections 18, 28, and 35** – Allow for the granting or expropriation of communal land rights, subject to registration, consultation, and compensation. This	• Relevant where portions of the existing servitude intersect communal or resettlement land. • Confirms that any impacts on communal land

LEGISLATION	PROVISION	PROJECT IMPLICATIONS
	provides a framework should any portion of the existing servitude affect communal land along the pipeline route.	users must be managed through consultation with Traditional Authorities and Communal Land Boards. • Provides a legal framework for compensation or adjustment of communal rights if construction or maintenance activities interfere with existing uses.
Water Resources Management Act No. 11 of 2013	Provides for the management, protection, development, use and conservation of water resources in Namibia. **Section 34** – Allows the Minister to acquire or register servitudes necessary for the abstraction, storage, transmission or distribution of water. **Section 35** – Provides conditions for compensation to landowners affected by servitudes for waterworks and pipelines. **Section 36** – Deals with rights of access to land for construction, operation, and maintenance of water supply infrastructure.	The Act empowers the State to register and utilise servitudes for water infrastructure such as pipelines, ensuring that the proposed project falls within its legal mandate. It also grants authorised access rights for the construction, operation, and maintenance of waterworks along the servitude. Furthermore, the Act emphasises sustainable management of water resources, reinforcing the need for environmental safeguards during project implementation.

4.1.3 Applicable legislation

To safeguard the environment and ensure that the proposed development is implemented in an environmentally and socially responsible manner, a range of environmental legislation must be considered. These legal instruments provide the framework for compliance during project planning, construction, and operation.

Table 7 outlines the key environmental legislation relevant to the project, along with the specific provisions and implications for its implementation.

Table 7: Cross-sectoral legislation applicable to the Project

LEGISLATION	PROVISION	PROJECT IMPLICATIONS
Constitution of the Republic of Namibia (1990)	Articles 91 (c) commands the state to actively promote and sustain the environmental welfare of the nation by formulating and institutionalizing policies to accomplish the sustainable objectives which include: • Guarding against overutilization of biological natural resources, • Limiting over-exploitation of non-renewable resources, • Ensuring ecosystem functionality, • Protecting Namibia's sense of place and character. • Maintain biological diversity. • Pursuing sustainable natural resource use. Article 95 (l) recites: "The State shall actively promote… maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future". Furthermore, Article 95 (l) ensures that workers are paid a living wage adequate for the maintenance of a decent standard of living and the enjoyment of social and cultural opportunities.	The proponent shall be advocating for sound environmental management through the implementation of the environmental management plan, as set out in the constitution.
Namibia Water Corporation Act 12 of 1997	To establish the Namibia Water Corporation Limited; to regulate its powers, duties, and functions; to provide for more efficient use and control of water resources, and to provide for incidental matters. Without prejudice to the generality of section 5, the Corporation shall perform the following functions in pursuit of its objects under this Act, namely – (a) Explore, develop, and manage water resources for water supply. (b) Acquire, plan, design, construct, extend, alter, maintain, repair, operate, control, and dispose of waterworks. (c) Subject to section 7 and notwithstanding any provisions of the Water Act to the contrary, supply water to customers within and outside the borders of the Republic of Namibia. (d) Investigate, research, and study matters relating to water resources, waterworks, and the environment. (e) Take such action as the Corporation may consider necessary or as the Minister may direct to conserve or augment water resources in Namibia.	The Act makes provision for the planning & designing, construction, operation, maintenance and decommissioning of the proposed Gibeon Upgrade Project. NamWater is carrying out its functions as mandated by the Act.

LEGISLATION	PROVISION	PROJECT IMPLICATIONS
	(f) Render services, provide facilities, and lease rights, subject to the payment of relevant charges. (g) establish training facilities and train personnel; and (h) Perform any other function as may be necessary or expedient for the achievement of the Corporation's objects.	
Environmental Management Act 7 of 2007	The purpose of this Act is to promote the sustainable management of the environment and the use of natural resources by establishing principles for decision-making on matters affecting the environment; to provide for a process of assessment and control of projects which may have significant effects on the environment, and to provide for incidental matters. The Act gives legislative effect to the Environmental Impact Assessment Policy. Moreover, the act also provides procedures for adequate public participation during the environmental assessment process for the interested and affected parties to voice and register their opinions and concern about the proposed project. The Environmental Impact Assessment Regulations Government Notice No. 30, promulgated on 6 February 2012. The regulations listed certain activities that require an ECC from MEFT: DEA before commencing.	Application for the Environmental Clearance Certificate for the activities will be submitted to the competent and regulatory authority.
Water Resources Management Act, 2013 (Act No. 11 of 2013)	The Water Resources Management Act, 2013 establishes a comprehensive legal framework for the management, protection, development, use, and conservation of Namibia's water resources. Its overarching goal is to ensure that water is managed in an equitable, efficient, and sustainable manner for the benefit of all people and the environment. The Act seeks to: • Promote integrated water resources management that balances social, economic, and environmental needs. • Protect and restore water resources and ecosystems against over-abstraction and pollution. • Establish institutional mechanisms such as Basin Management Committees to enable local participation in water governance. • Ensure equitable access to safe and sufficient water for domestic, agricultural, and industrial purposes. • Prevent and control pollution and promote the long-term sustainability of water	The Gibeon Water Supply Pipeline Replacement Project involves the replacement of existing bulk supply pipelines that convey groundwater from already licensed boreholes to the Gibeon settlement. Although no new drilling or abstraction will occur, the project must ensure that existing water use licences remain valid and that construction activities fully comply with the Act and its Regulations. All works must be undertaken in a manner that prevents contamination of groundwater, surface water, and surrounding environments, especially

LEGISLATION	PROVISION	PROJECT IMPLICATIONS
	resources. • Align national water management with Vision 2030 and the Environmental Management Act, 2007. Relevant Provisions: • Section 59 – Pollution Prevention: No discharge of pollutants (e.g., fuel, oil, or wastewater) may enter groundwater or watercourses during construction or operation. Pollution control measures must always be in place. • Section 74 – Protection of Watercourses and Riparian Ecosystems: Construction near rivers, drainage lines, or other watercourses must include erosion and sediment control measures to protect aquatic habitats. • Section 128 – Offences and Penalties: Non-compliance with any provision of the Act, such as pollution or failure to report incidents, may result in fines or imprisonment. Compliance monitoring and record-keeping are mandatory.	during pipeline trenching, valve installation, and bulk meter replacement. Proper handling and storage of fuels, lubricants, and wastewater are essential to safeguard the groundwater system supplying the Gibeon settlement.
Water Resources Management Regulations, 2023 (GN 269/2023)	• Regulation 6 – Evaluation and Approval of Water Treatment Processes - All water treatment processes must be evaluated and approved by the Minister to ensure safety and compliance with potable water standards. • Regulation 7 – Operation of Treatment Facilities - Only competent and trained persons may operate or maintain water treatment facilities. • Regulation 8 – Operational Standards and Maintenance - Water treatment facilities must be operated and maintained to prevent contamination and ensure consistent water quality. • Regulation 9 – Safety and Emergency Procedures - Facilities must have safety measures and emergency response procedures in place for handling hazardous materials used in treatment processes. • Annexure 1 – Water Quality Guidelines and Standards for Potable Water	• The existing gas chlorination process at the Gibeon reservoir must continue to operate under NamWater's approved treatment system, with any upgrades or changes submitted for review and approval by the Directorate of Water Resources Management (DWRM). • NamWater must ensure that the chlorination system is managed by qualified personnel trained in chlorine handling, safety procedures, and maintenance. • Routine inspections and maintenance of chlorination equipment, gas cylinders, and safety systems must be conducted to ensure compliance and operational reliability. • The chlorination building must be equipped with proper ventilation, leak

LEGISLATION	PROVISION	PROJECT IMPLICATIONS
		detection, protective equipment, and emergency response protocols for chlorine handling. • Chlorination dosage and monitoring must ensure that treated water consistently meets the potable water standards outlined in Annexure 1.
Forest Act No. 12 of 2001 (as amended)	Section 22. (1) provides: "Unless otherwise authorised by this Act, or by a licence issued under subsection (3), no person shall on any land which is not part of a surveyed erven of a local authority area as defined in section 1 of the Local Authorities Act, 1992 (Act No. 23 of 1992) cut, destroy or remove - (a) vegetation which is on a sand dune or drifting sand or on a gully unless the cutting, destruction or removal is done for the purpose of stabilising the sand or gully; or (b) any living tree, bush or shrub growing within 100 metres of a river, stream or watercourse."	Ensure protection and preservation of trees in line with the Act.
Nature Conservation Ordinance 14 of 1975 (as amendment)	The Nature Conservation Amendment Act 5 of 1996 amends the Nature Conservation Ordinance, 1975, "so as to provide for an economically based system of sustainable management and utilization of game in communal areas; to delete references to representative authorities; and to provide for matters incidental hereto." Section 73. 1) provides: "No person other than the lawful holder of a permit granted by the local authority shall at any time pick ("pick", as defined in Section 1 (xxxviii), includes to cut off, chop off, pick off, take, gather, uproot, damage or destroy) or transport any protected plant: Provided that – (a) the owner a nursery licensed under section 75 may without such permit pick and transport any protected plant cultivated on the premises of such nursery and cause such protected plant to be picked and transported; (b) the owner or lessee of land may on that land without such permit pick the flower of a protected plant for use as a decoration in his home; (c) the owner or lessee of land may without such permit pick a protected plant on that portion of such land – (i) which he needs for cultivated lands, the erection of a building, the construction of a road or airfield or any other development which necessitates the removal of vegetation; or (ii) on which such protected plant has been specially cultivated" (Nature Conservation Ordinance 4 of 1975, Chapter VI INDIGENOUS PLANTS, Picking and transport of protected plants).	Ensure protection and preservation of natural resources in line with the Ordinance. All protected plants will have to be identified and marked before construction starts. In case there is an intention to remove protected species, permits will be required from the Forestry Department of the Ministry of Agriculture, Water and Forestry.
Soil Conservation Act No.76 of 1969	The Act provides for the prevention of soil erosion, the protection and conservation of soil, and the sustainable use of land resources in Namibia. It promotes responsible land management practices to reduce land degradation.	The Gibeon Water Supply Pipeline Replacement Project will be confined mainly to the existing service road

LEGISLATION	PROVISION	PROJECT IMPLICATIONS
	Land users are required to take reasonable measures to prevent soil erosion and degradation during construction, excavation, or any land-disturbing activities.	corridor where vegetation is sparse. Only minor clearing (1–2 m widening) may occur, with no mature trees affected. Therefore, the risk of soil disturbance and erosion is minimal. Nevertheless, basic erosion control and proper backfilling will be applied to maintain soil stability and comply with the Act.
Public Health and Environmental Act No. 1 of 2015	Section 119 of this Act prohibits the existence of a nuisance on any land owned or occupied by the Proponent. The term nuisance is important for this EIA, as it is specified, where relevant in Section 122 as follows: • Any dung pit, slop tank, ash pit, or manure heap so foul or in such a state or so constructed as to be offensive or to be injurious or dangerous to health. • Any other condition that is offensive, injurious, or dangerous to health. Sanitary conveniences: An employer shall provide water closets which are readily accessible to the employees, in the following ratio to employees having to use such water closets – if the number of employees is less than 75, not less than one water-closet for every 15 employees, or part thereof, of each sex; if the number of employees exceed 75, but is less than 400, not less than one additional water-closet shall be provided for every 25 employees, or part thereof, of each sex, in excess of 75 employees; or If the number of employees exceeds 400, not less than one additional water closet shall be provided for every 50 employees, or part thereof, of each sex, excess of 400 employees. An employer who employs five or more male employees shall provide not less than one urinal for every 25 male employees, or part thereof. The toilets for each sex, and the entrances to such toilets, shall, to the satisfaction of an inspector, be properly separated and clearly marked.	Nuisance such as dust, noise, bad odours, etc. should be controlled during all project phases. Sanitary conveniences should be provided for as per the minimum requirements prescribed by the law.
Communal Land Reform Act No. 5 of 2002	Provides for the allocation and administration of all communal land and makes provision for the prevention of negative impacts to the natural environment.	Cognisance should be taken of the fact that the area is situated within a communal area and the applicable rights should thus be respected.
Traditional Authorities	Section 3 of the Traditional Authorities Act gives certain powers, duties and functions	Cognisance and involvement from the

LEGISLATION	PROVISION	PROJECT IMPLICATIONS
ActNo. 25 of 2000	to traditional authorities and members thereof. Section 3(2)(c) of theAct touches on the environmental responsibility of traditional authorities.	side of the applicable traditional authority becomes necessary to ensure sustainable development to the benefit of the larger community.
National Labour Act 11 of 2007	The objectives of the National Labour Act are: • To establish a comprehensive labour law for all employers and employees; to entrench fundamental labour rights and protections. • Regulate basic terms and conditions of employment. • Ensure the health, safety, and welfare of employees and protect employees from unfair labour practices. • To regulate the registration of trade unions and employers' organization and regulate collective labour relations. • To provide systematic prevention and resolution of labour disputes. Some of the notable Sections under this Act are. Health and Safety Procedures Section 17 (1) The employer shall prepare any health and safety procedure referred to in sub-regulation (1) in consultation with the workplace safety committee concerned. Section 21. (1) Any person who intends to commence any mining operation shall give 30 da notice of such intention to the Minister. Section 22. (1) In the event of an accident or dangerous occurrence in or in connection with a workplace, including a mine, or if an employee dies, or suffers a serious injury because of such an accident or dangerous occurrence, the employer shall notify and report such accident to the Chief Inspector of Labour of the area. Notification of Occupational Diseases (OD), Section 23. If a medical practitioner finds that any person is suffering from an occupational disease listed in Annexure A. 2(1), or of any other disease that he or she believes was caused by that person's current or past employment, he or she shall immediately and in the form of Form OD. 1, report this fact to the Chief Medical Officer of Occupational Health and Safety. It shall be an unfair dismissal, or unfair disciplinary action, in terms of section 45 by an employer if such employer terminates the services of, or takes disciplinary action against, such employee if such employee has contracted an occupational disease listed in Annexure A. 2 (1), or any other disease, because of his or her past or present employment with such employer.	The Employer need to comply with health and safety regulations pertaining to the health and safety of employees. The Proponent, Contractors, Sub-Contractor shall all be guided by this Act when recruiting or handling employment-related issues. Contractors must adhere to the minimum workplace safety standards such as all employees must be provided with appropriate Personal Protective Equipment (PPE).

LEGISLATION	PROVISION	PROJECT IMPLICATIONS
	Section 210, states that an employer shall ensure that an employee wears or uses, to the satisfaction of an inspector, suitable and adequate personal protective equipment.	
Regulations relating to the health and safety of employees at work are contained in GN 156/1997 (GG 1617)	Annexure E: Schedule 1 (2) lays out the occupational exposure limits for airborne hazardous substances, including amongothers all forms of asbestos. Annexure E: Schedule 2 (1) details the Asbestos Regulations, providing for the management and control with respect to asbestos in work environments	Any work related to the handling and disposal of the asbestos cement pipeline should adhere to the provisions of these regulations – airborne exposure limits should not be exceeded.
National Heritage Act No. 27 of 2004	The Act is aimed at protecting, conserving, and registering places and objects of heritage significance.	All protected heritage resources (e.g., human remains, etc.) discovered, need to be reported immediately to the National Heritage Council (NHC) and require a permit from the NHC before they may be relocated.
MEFT Policy on HIV/AIDS	MEFT has recently developed a policy on HIV/AIDS. In addition, it has also initiated a programme aimed at mainstreaming HIV/AIDS and gender issues into environmental impact assessments.	The proponent and its Contractor must adhere to the guidelines provided to manage the aspects of HIV/AIDS. Experience with construction projects has shown that a significant risk is created when migrant construction workers interact with local communities.
Local Authorities Act No. 23 of 1992	The Local Authorities Act prescribes how a town or municipality should be managed by the Municipal Council.	The development must comply with provisions of the Local Authorities Act.
Urban and Regional Planning Act No. 5 of 2018	The Act and Regulations combine the Townships Board and Namibia Planning Advisory Board (NAMPAB) into one to be known as the Urban and Regional Planning Board and delegate the decisions on town planning applications to Local Authorities. However, an LA can only make decisions after the MURD has declared a Local Authority as an Authorised Planning Authority (APA).	The Development must comply with the provisions of the Urban and Regional Planning Act
White Paper on National Water Policy for Namibia	The Policy focus on resource sustainability, sustainable utilization and accessibility to water. The policy also refers to the right of every citizen to obtain, within reasonabledistance from their place of abode, a quantity of water sufficient to maintain life, health and productive activity.	Obligation to use water resource in a sustainable way and to properly maintain the water supply and distribution system.

4.1.4 International Legal Requirements

The international treaties and conventions applicable to the project and worth taking note of are listed below in Table 8 below.

Table 8: International Treaties and Conventions applicable to the Project

LEGISLATION	PROVISION	PROJECT IMPLICATIONS
Convention on Biological Diversity 1992	Namibia is a signatory to the Convention on Biodiversity, committing it to the preservation of species, particularly rare and endemic species, within its boundaries.	As a signatory also to the Convention to Combat Desertification Namibia is also bound to prevent excessive land degradation that may threaten livelihoods.
The United Nations Convention to Combat Desertification (UNCCD)	Address land degradation in the dry lands with the purpose to contributeto the conservation and sustainable use of biodiversity and the mitigation of climate change.	Activities should not be of such that it contributes to negative implications on biodiversity and as a resultstimulate climate change.
Stockholm Declaration on the Human Environment, Stockholm (1972)	It recognizes the need for: “a common outlook and common principles to inspire and guide the people of the world in the preservation and enhancement of the human environment.	Protection of natural resources and prevention of any form of pollution.
United Nations Sustainable Development Goals (SDGs) 2015	The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership. They recognise that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.	Of specific relevance to ecology is SDG 15: Life on Land which aims to “Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss”

5 DESCRIPTION OF THE AFFECTED ENVIRONMENT

This chapter provides a description of the wider study area in terms of both biophysical and socio-economic characteristics. It establishes the environmental baseline against which potential positive and negative impacts of the proposed project can be assessed, together with their likely significance.

The chapter outlines the baseline conditions of the receiving environment, focusing on environmental receptors that may be affected by the project. These receptors encompass both the socio-economic context and the biophysical environment.

- **Socio-economic baseline:**

  Impacts on socio-economic aspects are expected to extend over a wider geographical area, potentially at constituency, regional and national levels. Accordingly, the socio-economic baseline provided in this chapter reflects the characteristics of the community and broader social systems within which the project is located.

- **Biophysical baseline:**

  The baseline study area for physical and ecological data collection primarily covers the direct zone of influence of the proposed pipeline, including associated facilities and supporting infrastructure. This provides the basis for identifying sensitive receptors, defining appropriate mitigation measures, and determining whether further detailed assessments are required.

5.1 SOCIAL ENVIRONMENT

5.1.1 About the town

Gibeon is a village in the Gibeon Constituency of the Hardap Region (Figure 12), located in central-southern Namibia. It lies to the west of the B1 national road, approximately 72 km south of Mariental and 176 km north of Keetmanshoop. Owing to its strategic location along the B1 corridor, Gibeon serves as an important rural settlement with access to regional transport routes, while also supporting surrounding communities within the constituency.

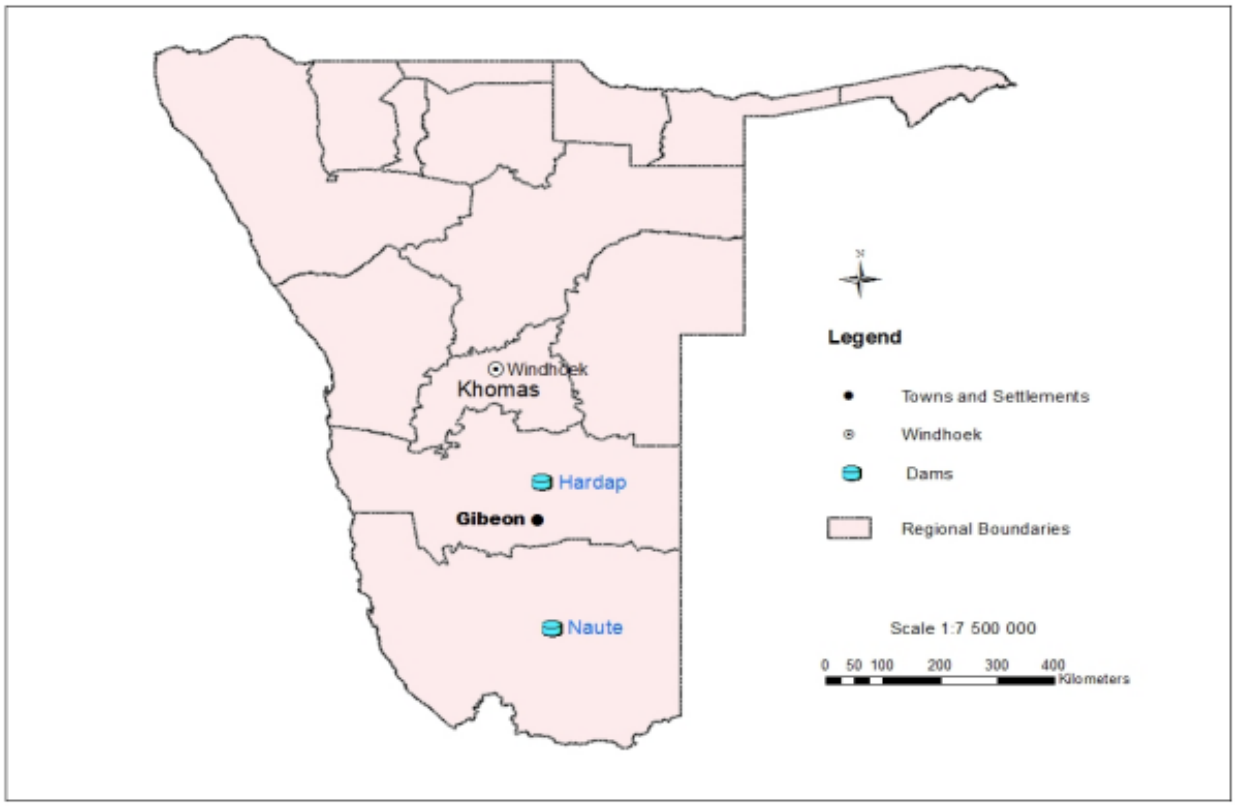


Figure 12: Gibeon Location Map (NamWater, 2023)

5.1.2 Demographic settings - Gibeon Constituency

The Gibeon Constituency recorded a population of 8,034 inhabitants in the 2023 Census, an increase of 26.4% since 2011. With a land area of approximately 10,156 km², the constituency remains sparsely populated, with a density of just 0.8 persons/km², reflecting its predominantly rural character.

The population is relatively young, with around one-third below the age of 15, while about 7% are elderly. This demographic structure may suggest that there is a potential pool of young people who could contribute to temporary employment opportunities during the construction phase of the project, if appropriate. At the same time, the proportion of elderly residents highlights the importance of accessible communication and engagement methods.

Households in the constituency average 3.2 persons, with just under 40% being female headed. Main income sources include wages and salaries, pensions, and some farming. While the project itself is limited to pipeline construction, these socio-economic conditions suggest areas where benefits and engagement activities could be tailored to local realities.

A summary of the key population dynamics and socio-economic indicators for Gibeon Constituency is presented in Table 9 below.

Table 9: Population dynamics of the Gibeon Constituency (Namibia Statistics Agency (NSA), 2023))

Indicator	Value	Interpretation / Notes
Total Population	8,034	Increased from 6,354 in 2011 (+26.4% growth).
Male Population	4,342 (54%)	Higher male dominance (sex ratio = 118 males per 100 females).
Female Population	3,692 (46%)	Slightly fewer females compared to males.
Land Area	10,156 km²	Large geographic size, sparsely populated.
Population Density	0.8 persons/km²	Reflects largely rural and dispersed settlement patterns.
Households	2,331	Average household size = 3.2 persons (down from 4.2 in 2011).
Female-Headed Households	39.3%	Indicates gendered household responsibility.
Age Structure	0–14 yrs: 32.5% 15–64 yrs: 60.0% 65+ yrs: 7.4%	Young population with notable elderly segment.
Median Age at First Marriage	30.3 yrs (M: 31.6; F: 29.1)	Among the highest in Hardap.
Main Sources of Income	Wages & salaries: 37.3% Old-age pension: 23.1% Farming: 11.8%	Shift away from agriculture, increased reliance on wages and pensions.

5.1.3 Demographic settings - Gibeon Village

Within the constituency, the village of Gibeon is home to an estimated 4,120 inhabitants (NSA, 2023).

As the administrative centre of the constituency, Gibeon plays an important role in local service delivery and will likely serve as a focal point during project implementation. The Orab–Gibeon bulk pipeline, which forms part of the Gibeon Water Supply Scheme operated by NamWater Business Unit South, currently supplies the settlement.

Given its size and role, the village may be the most practical location for engagement meetings, awareness activities, or temporary support facilities linked to the pipeline construction. While no significant impacts are anticipated at the settlement level beyond improved supply reliability, ensuring that the community is kept informed and engaged may help to strengthen project acceptance and ownership.

A summary of the demographic profile of Gibeon Village is presented in Table 10 below.

Table 10: Demographic profile of Gibeon Village (NSA, 2023)

Indicator	Value	Interpretation / Notes
Total Population	4,120	Represents about half of the total population of Gibeon Constituency.
Households	560	Settlement-scale households managed under the Village Council.
Average Household Size	3.2 persons	In line with the constituency average.
Erven	700	Total plots registered under the village area.
Metered Water Points	370	Bulk water supplied via NamWater and distributed by the Village Council.
Administrative Authority	Gibeon Village Council	Responsible for local service delivery, including water account management.

5.1.4 Economic and social development

The settlement of Gibeon serves as the administrative centre of the constituency and falls under the Gibeon Village Council, which is responsible for municipal services such as water account management, erven administration, and local service delivery.

The constituency functions primarily as an agricultural area, with farming activities centred on livestock rearing, particularly sheep, goats, and cattle. These activities form the main source of income for households in the rural areas, supporting both subsistence use and commercial meat production. Seasonal hunting of wildlife also contributes to household protein intake and, to a lesser extent, income generation.

Businesses operating in the village include small retail shops, informal traders, and service-related enterprises, which provide goods and services to both the local population and the surrounding farming communities. Basic services in the area include public schools, a clinic, a police station, a post office, and churches, with most facilities concentrated in Gibeon settlement. The town thus functions as a service hub for the wider constituency.

As in many rural constituencies in Namibia, unemployment remains a major challenge, particularly among young people, placing pressure on households that rely heavily on pensions and social grants as income sources.

5.1.5 Land Use

Land use within the project area is primarily for agriculture (livestock farming) and residential purposes. The proposed pipeline traverses a total of eight farms, comprising:

- **Four commercial farms**: Orab North, Orab South, Sonnerau, and Jakkels Fountain. These are used mainly for large-scale livestock farming.
- **Four communal resettlement farms**: Vaaldam, Southput, Falkenhorf, and Hobby Garden. These farms accommodate resettled households, with some clusters of

residential dwellings established along the pipeline route. Communities in these areas rely on the pipeline both for domestic water supply and for small-scale agricultural activities.

- **Socio-economic relevance**

  The dependence of both commercial and communal farmers on NamWater's bulk water supply means that the pipeline is a lifeline for local livelihoods. For commercial farms, it underpins livestock production and farm operations, while for resettled communities it ensures access to potable water for domestic use and supports household-level farming.

  Communal resettled communities are particularly water-dependent and less resilient to supply interruptions, as they have limited alternative sources and rely on clustered connection points for both domestic use and subsistence farming. This increases their vulnerability to pipeline failures or extended service disruptions, underscoring the importance of the upgrade in safeguarding household water security and reducing socio-economic risk.

5.1.6 Water Supply

The settlement includes approximately 700 erven and about 560 households, supplied with water through 370 metered water points managed by the Village Council. Bulk supply for both Gibeon settlement and the surrounding farms is provided via the Orab–Gibeon bulk pipeline, which forms part of the Gibeon Water Supply Scheme operated by NamWater Business Unit South.

Farmers are supplied directly from this pipeline through the Directorate of Rural Water Supply. According to the Scheme Superintendent, Mr. Tuhafeni Shilyomunhu (personal communication, 10 October 2025), there are approximately 60 water connection points along the pipeline. These serve both commercial operations and communal households, providing a vital source of water for farming and residential needs.

5.1.7 Archaeological and heritage context

The Gibeon area holds both archaeological and historical significance in Namibia. The wider Gibeon area is noted for its archaeological and historical background, most prominently the Gibeon Meteorite Shower, one of the largest meteorites falls in the world (Geological Survey of Namibia, 2010). In addition, evidence of early human activity, such as stone tools, has been recorded in parts of the Hardap Region (Kinahan, 2011). Gibeon is also linked to the Nama people and has historical associations with the colonial conflicts of the late 19th and early 20th centuries (Wallace, 2011).

Within Gibeon settlement, certain structures such as mission-era churches and public buildings contribute to the local historical character (National Heritage Council of Namibia, 2020). At present, there are no known archaeological or heritage sites recorded within the proposed pipeline construction corridor. However, given the broader heritage value of the region, it is considered good practice to apply a chance finds procedure during construction. This would ensure that, in the unlikely event that artefacts or heritage remains are uncovered, they can be reported to and managed in consultation with the National Heritage Council of Namibia (NHC, 2020).

5.2 BIOPHYSICAL ENVIRONMENT

5.2.1 Climate

- **Precipitation**

Rainfall in the Gibeon area is low and highly variable, reflecting the arid conditions of southern Namibia. Average annual rainfall ranges between 150–200 mm, with the highest amounts recorded in the north-eastern parts of the constituency and the lowest in the south-west. Rainfall is typically seasonal, occurring mainly between December and March, often in short, intense thunderstorms.

The patchy distribution of rainfall, combined with high evaporation rates, results in limited surface water availability, making the area heavily reliant on groundwater and bulk water transfer schemes for reliable supply. The spatial distribution of average annual rainfall across Namibia, including the Gibeon area where values range between 150–200 mm, is illustrated in Figure 13 below.

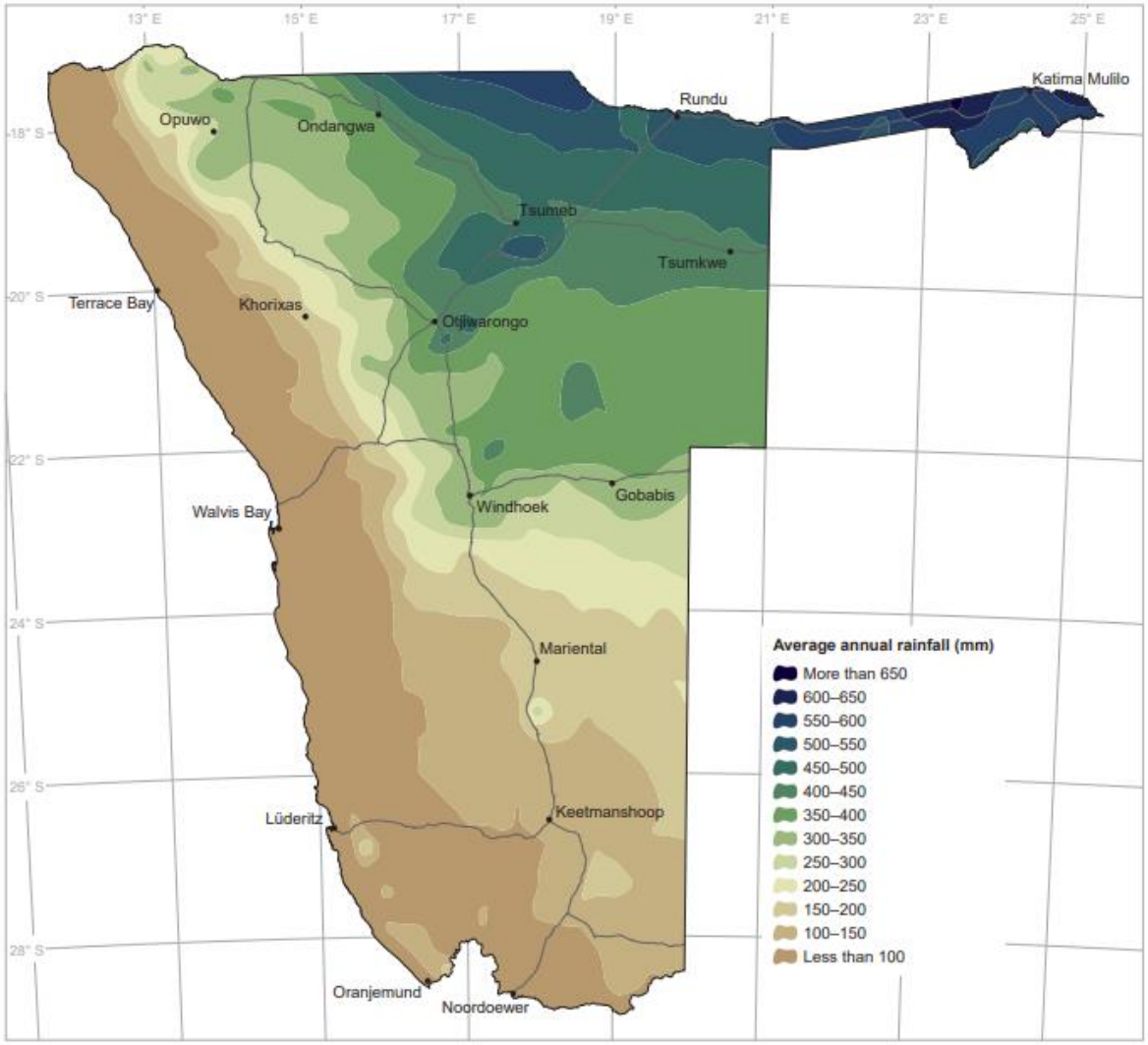


Figure 13: Average annual rainfall distribution in Namibia, showing the Gibeon area within the 150–200 mm zone (Atlas of Namibia Team, 2022)

- **Temperature, humidity, and evaporation rate**

The climate of the Gibeon area reflects the arid conditions of southern Namibia. Temperatures can vary considerably between day and night, with very hot days in summer often exceeding 40–45°C, and cold winter nights occasionally dropping close to 0°C or lower. Average maximum temperatures for the Hardap Region range between 32–36°C in the hottest months, while minimum winter temperatures can fall below 5°C, especially during frontal systems moving in from the south. The average annual temperature distribution for Namibia, including the Gibeon area, is illustrated in Figure 14 below.

Humidity levels are generally low throughout the year, averaging 20–40% in most months. This contributes to high evaporation rates, with the Gibeon area recording an average annual potential evaporation of more than 2,600 mm/year, far exceeding average rainfall.

These conditions underline the arid and water-scarce nature of the project area. The high evaporation rates, in combination with limited and variable rainfall, make groundwater and bulk water transfer schemes essential for ensuring reliable water supply.

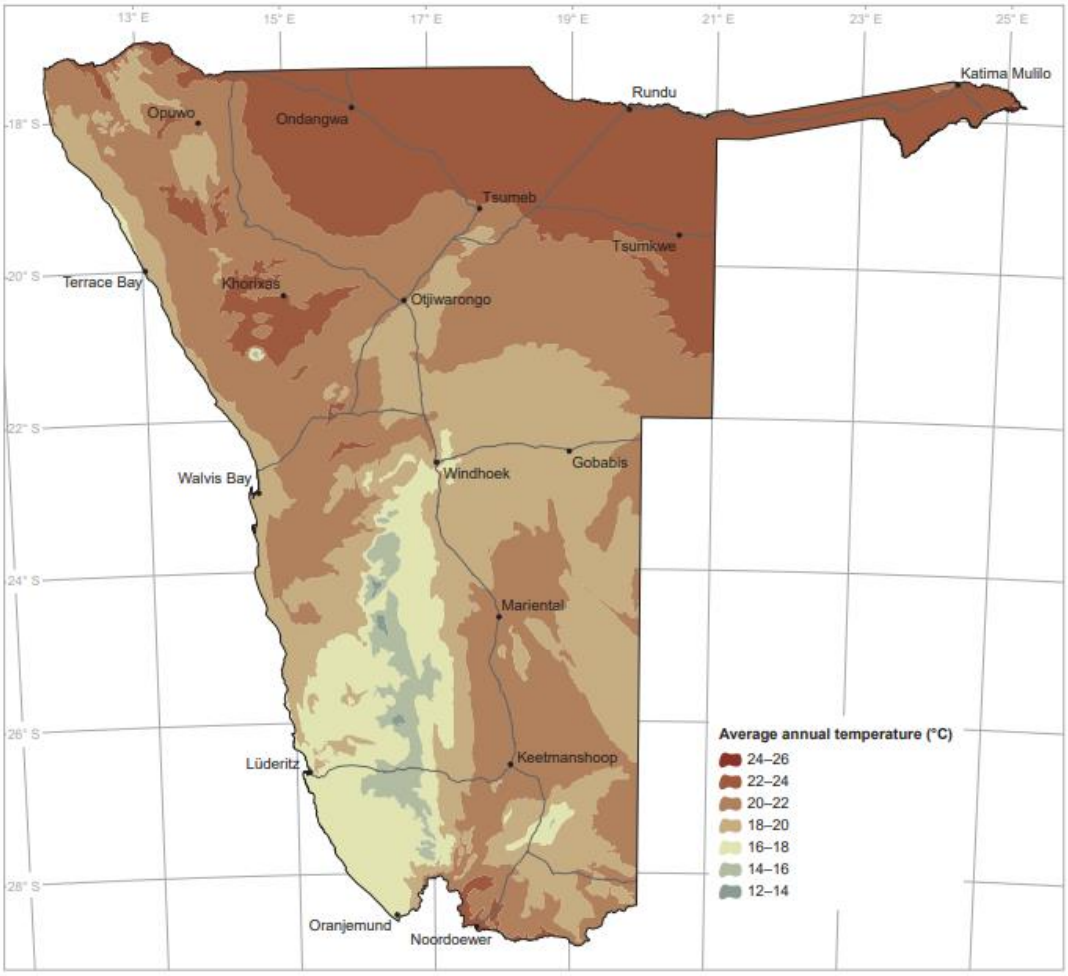


Figure 14: Mean annual temperature ranges for Namibia, with the Gibeon area located predominantly within the 20–22°C zone (Atlas of Namibia Team, 2022)

- **Wind**

The Gibeon area is characterised by moderate to strong winds, typical of the southern Namibian plateau. Prevailing winds are predominantly from the south-east and east, with seasonal variations linked to regional pressure systems (Atlas of Namibia Team, 2022). During winter months, strong easterly winds occur, often associated with dry air masses and dust movement. In summer, wind speeds are generally lower, though localised gusts can develop during thunderstorms.

Average wind speeds are estimated at 10–18 km/h, with occasional gusts exceeding 30–40 km/h (Atlas of Namibia Team, 2022; MEFT, 2015). These winds contribute to high evaporation rates and the dispersal of dust, particularly during construction activities where soil disturbance will be unavoidable.

From a project perspective, wind conditions are relevant for:

- **Construction phase**: potential for dust nuisance and localised health impacts if not mitigated;
- **Operation phase**: minimal impact, except where strong winds may affect above-ground infrastructure markers or signage;
- **Decommissioning phase**: windborne asbestos fibres may pose risks if asbestos cement pipe removal is undertaken without strict controls (Groundwater in Namibia, 2011; MEFT, 2020).

Mitigation measures during construction should include dust suppression (e.g., water spraying), limiting earthworks during peak wind conditions, and ensuring workers are provided with appropriate personal protective equipment (PPE).

5.2.2 Topography, Drainage, Hydrogeology and Water Resources

- **Topography**

The Gibeon–Mariental area is characterised by gently undulating plains and broad valleys, typical of the southern Kalahari Basin. Elevations generally range between 1,100 and 1,400 metres above sea level, gradually sloping from the interior highlands toward the south and southeast. These plains are interspersed with low ridges and occasional inselbergs formed from resistant rock, shaped over long geological periods (Atlas of Namibia Team, 2022). The regional topography, including the Gibeon–Mariental area, is shown in

Figure 15.

- **Drainage**

Drainage is dominated by ephemeral rivers and tributaries, most notably of the Fish River catchment, which flow only during heavy rainfall. These channels are important for episodic groundwater recharge but provide no permanent water resources.

- **Hydrogeology & Water Resources**

The area forms part of the Stampriet Artesian Basin (SAB), a major transboundary aquifer shared between Namibia, Botswana, and South Africa. Groundwater occurs mainly in the Auob and Nossob sandstones, confined by shale and overlain by Kalahari deposits. Artesian

conditions occur in places, while sub-artesian conditions prevail elsewhere (Christelis & Struckmeier, 2011). Recharge is episodic, primarily through calcrete sinkholes and depressions after intense rainfall.

Water quality varies spatially: it is generally suitable in the northwest but increasingly saline towards the southeast in the so-called “Saltblock”. Supplementary yields are obtained from fractured-rock aquifers in surrounding plateaus, but these are more limited.The location of the SAB within Namibia’s hydrogeological regions is illustrated in Figure 16.

For Gibeon settlement and surrounding farms, bulk supply is provided exclusively via the Orab–Gibeon pipeline, which transfers groundwater from production boreholes at Orab. This pipeline is the sole bulk supply system and is therefore vital for long-term water security in the constituency.

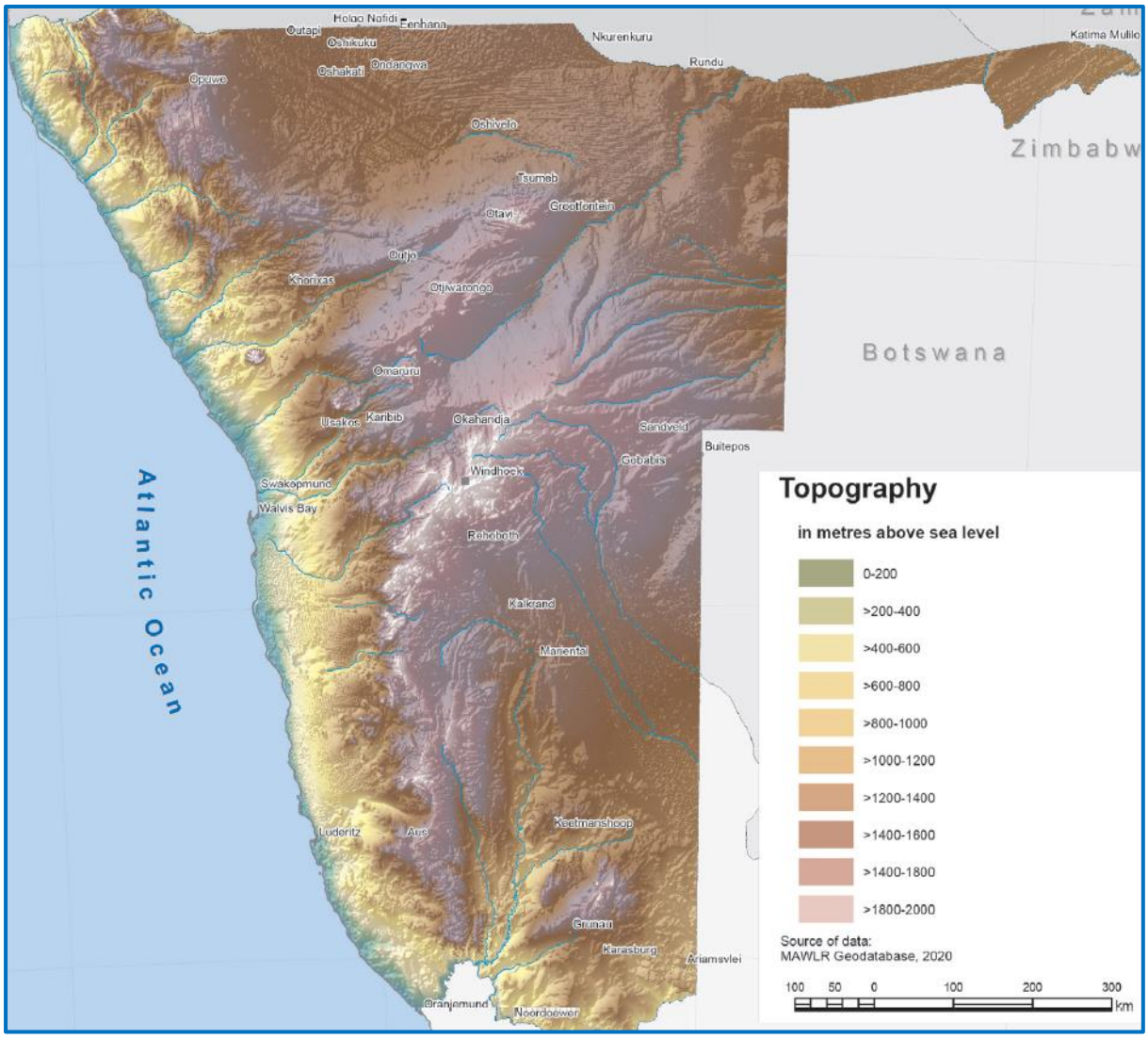


Figure 15: Topography of Namibia (Christelis & Struckmeier, 2011).

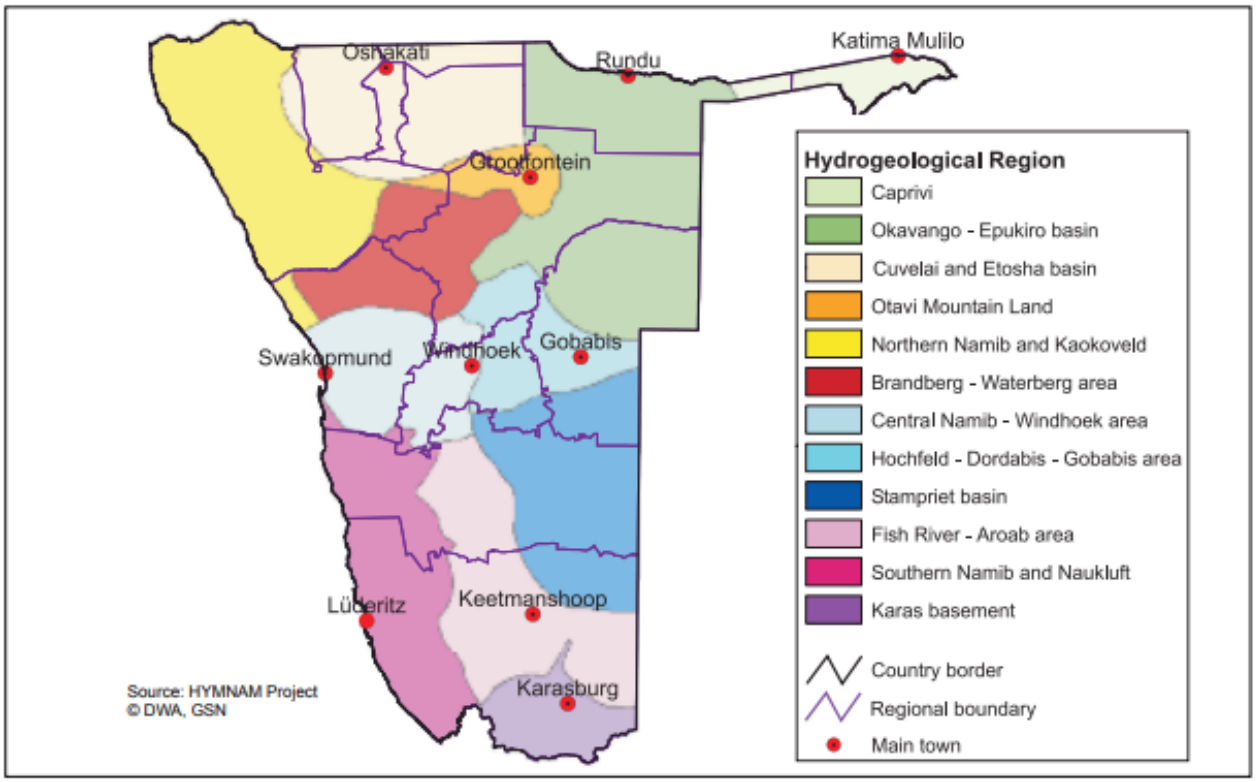


Figure 16: Groundwater basins and hydrogeological regions of Namibia

In summary, the reliance on groundwater from the Stampriet Artesian Basin and the absence of perennial surface water resources underline the importance of bulk water transfer infrastructure such as the Orab–Gibeon pipeline. Upgrading this pipeline is therefore critical to ensuring long-term water security for both Gibeon settlement and surrounding farming communities.

5.2.3 Geology

The Gibeon–Mariental area is underlain mainly by sedimentary rocks of the Karoo Supergroup, including sandstones, shales, and mudstones, which host the important Auob and Nossob aquifers of the Stampriet Artesian Basin. These are overlain by younger Kalahari sands and calcretes, which dominate the surface and facilitate localised recharge into the deeper aquifers through depressions and sinkholes. At greater depth, the area rests on the Damara metamorphic basement, intruded in places by dolerite dykes and sills of Jurassic age, which influence local groundwater flow patterns. The geological structure explains both the artesian and sub-artesian conditions found in the Stampriet Basin, while also accounting for the salinity problems in the “Saltblock” zone towards the southeast. Overall, the geology reflects Namibia’s long tectonic and depositional history, shaped by the formation and break-up of Gondwana, and provides the foundation for both groundwater availability and quality in the region (Atlas of Namibia Team, 2002; Christelis & Struckmeier, 2011).

5.2.4 Soils

Soils in the Gibeon–Mariental area are predominantly Arenosols, derived from Kalahari sands. These are deep, sandy, and nutrient-poor, with low water-holding capacity but generally good drainage. Associated soils include Calcisols (often with hard calcrete layers that limit rooting depth but reduce water loss) and Cambisols (shallow and of limited fertility). Along ephemeral drainage lines, more fertile Fluvisols occur, formed in recent alluvial deposits, supporting small-scale cultivation and better grazing. Shallow Leptosols and Regosols are also present on eroded slopes and rocky terrain, but they are fragile and highly erodible. Overall, the soils are best suited for extensive livestock grazing, with limited potential for arable farming (Atlas of Namibia Team, 2022).

Figure 17: Main soil types observed in the area

5.2.5 Local Occurring Flora

The vegetation of the Gibeon–Mariental area reflects the Nama Karoo–Kalahari transition zone, with a mix of drought-tolerant grasses, shrubs, and scattered trees. Species distribution depends on terrain, ranging from sparse shrubs in rocky areas to denser thickets of grasses and woody species on flatter plains. Vegetation diversity in the area is relatively low compared to other southern African ecoregions, with only about 3% of species endemic to the Kalahari biome (Atlas of Namibia Team, 2022). Nevertheless, these plant communities provide critical grazing for livestock, browsing for game, and ecological stability for the fragile rangelands.

The dominant species known to occur in the area are summarised in Table 11 below.

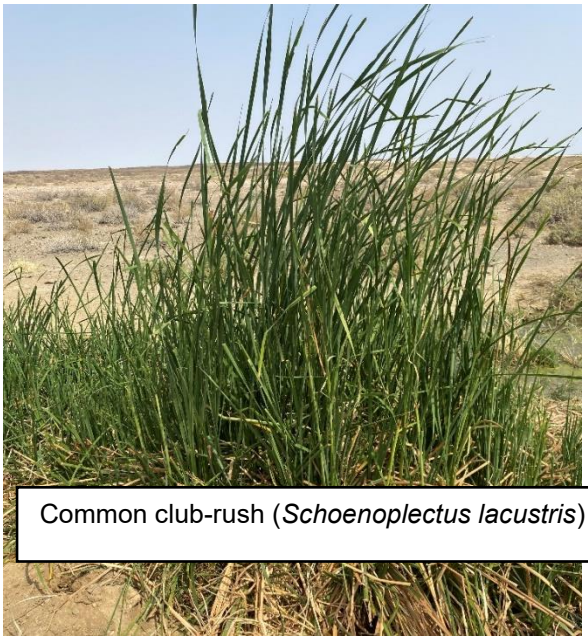
Table 11: Dominant Plant Species in the Gibeon–Mariental Area (Atlas of Namibia Team, 2022)

Group	Representative Species
Grasses	*Stipagrostis ciliata*, *Panicum maximum*, *Schmidtia kalahariensis*, *Aristida* spp., *Eragrostis* spp.
Shrubs	*Boscia foetida* (!hoe boss), *Grewia flava*, *Ziziphus mucronata*, *Tarchonanthus camphoratus*, *Rhigozum trichotomum*, *Acacia hebeclada*, *Lycium* spp.
Trees	*Senegalia mellifera*, Grey camelthorn (*Vachellia erioloba*), *Vachellia reficiens*, *Prunus spinosa*, *Boscia albitrunca* (shepherd's tree), Silver cluster-leaf (*Terminalia sericea*).

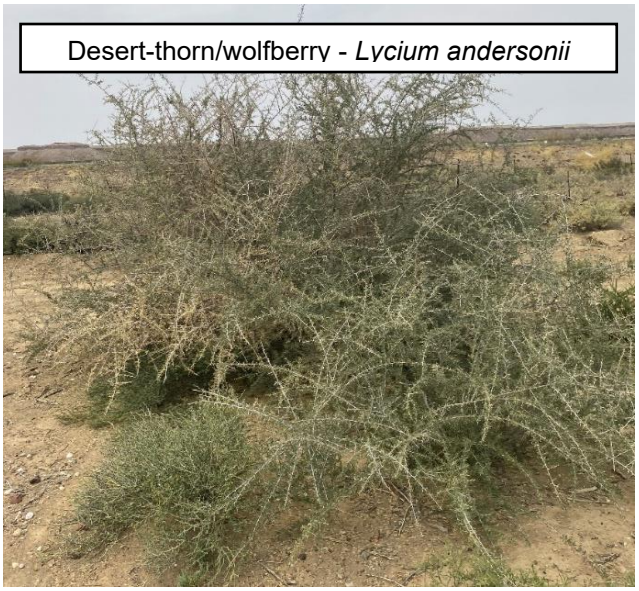
In addition to these expected species, a number of plants were directly recorded during the October 2025 site inspection, which are listed in Table 12 below.

Table 12: Plant Species Recorded During Site Inspection (September 2025)

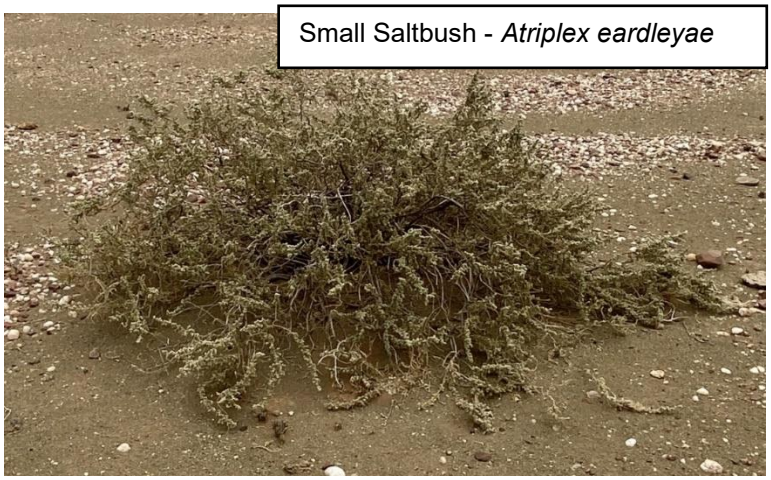
Group	Species	Notes / Location
Grasses	Sparse grass cover in rocky sections	Between km 39–36, area largely barren with minimal ground cover.
Shrubs	Desert-thorn (*Lycium andersonii*)Burrobush (*Ambrosia dumosa*) River Ganna (*Caroxylon aphyllum*) Cauliflower Ganna (*Caroxylon tuberculatum*) Small Saltbush (*Atriplex eardleyae*) Lye Ashbush (*Mesembryanthemum coriarium*)	
Trees	Umbrella thorn (*Acacia tortilis*)	A mature tree recorded between km 39–36 (rocky section).
Succulents	Aloe (*Aloe viridiflora* and other aloe stands under ID)	Dense aloe vegetation observed between 2–1.5 km near boreholes.
Others	Common club-rush (*Schoenoplectus lacustris*) Franchet's cotoneaster (*Cotoneaster franchetii*)	Localised wetter or disturbed habitats.



Common club-rush (*Schoenoplectus lacustris*)

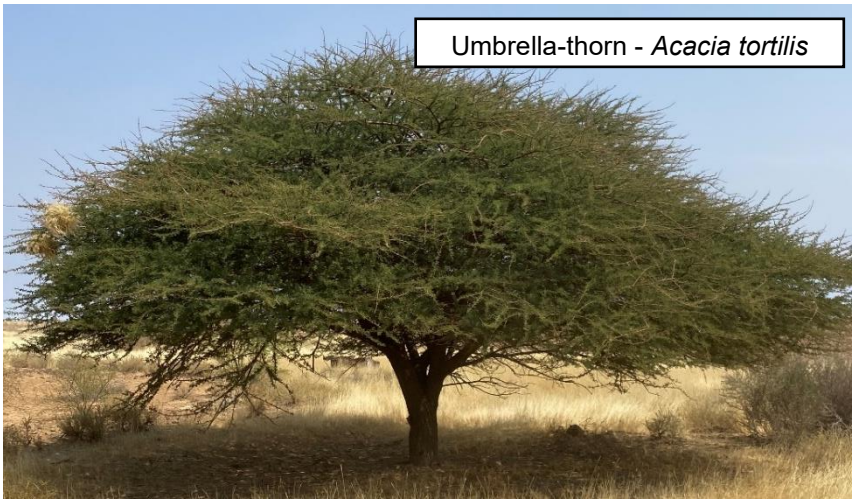


Desert-thorn/wolfberry - *Lycium andersonii*



Small Saltbush - *Atriplex eardleyae*

Cauliflower Ganna - *Caroxylon tuberculatum*



Umbrella-thorn - *Acacia tortilis*

River Ganna – *Caroxylon*

Figure 18: Pictures of the local vegetation

- **Implications and impacts**

Among the species recorded, Aloe viridiflora is of ecological interest as it is listed as endemic and vulnerable in Namibia. Several stands were observed approximately 10 metres from the proposed pipeline alignment. Although these are outside the servitude and are therefore unlikely to be directly affected, care should still be taken during construction to avoid unnecessary disturbance.

Other species such as *Boscia albitrunca* (shepherd's tree) and *Vachellia erioloba* (camelthorn) are protected under Namibian legislation. Importantly, these trees occur outside the registered servitude and the new pipeline will be confined within the existing alignment, meaning that no removal of these species is anticipated.

Overall, while sensitive and protected species occur in the wider area, the project design and servitude constraints reduce the likelihood of direct impacts, and their conservation will be supported through management measures outlined in the ESMP.

5.2.6 Local Fauna

The Gibeon–Mariental area supports fauna typical of the Nama Karoo–Kalahari transition, adapted to arid and semi-arid conditions. Mammals include springbok (*Antidorcas marsupialis*), kudu (*Tragelaphus strepsiceros*), steenbok (*Raphicerus campestris*), yellow mongoose (*Cynictis penicillata*), and black-backed jackal (*Canis mesomelas*). Birdlife is diverse, with kori bustard (*Ardeotis kori*), Ludwig's bustard (*Neotis ludwigii*), pale chanting goshawk (*Melierax canorus*), and sociable weaver (*Philetairus socius*). Reptiles such as the Namaqua chameleon (*Chamaeleo namaquensis*), puff adder (*Bitis arietans*), and leopard tortoise (*Stigmochelys pardalis*) are also present.

Overall, species richness is moderate, with no rare or endangered species recorded during the site inspection. The fauna of the area is dominated by common mammals (springbok, kudu, steenbok, yellow mongoose, black-backed jackal), widespread birds (kori bustard, sociable weaver, pale chanting goshawk), and reptiles (Namaqua chameleon, puff adder, leopard tortoise). The project footprint is confined to the existing servitude, which reduces the likelihood of habitat fragmentation or displacement.

- **Implications and impacts**

Potential impacts on fauna, such as temporary disturbance from noise and vehicle movement during construction, are expected to be localised and short-term. With mitigation measures (e.g. speed control, avoiding harm to reptiles and small mammals), no significant long-term impacts are anticipated (Atlas of Namibia Team, 2022; MEFT, 2020).

6 PUBLIC PARTICIPATION PROCESS

This chapter describes in detail the full extent of the public consultation process that was followed and the I&APs and authorities that were notified of the study being undertaken. It also includes the main issues and concerns raised during the public consultation processand comments received on the Background Information Document (BID).

The study was subjected to a public participation process as defined in the Environmental Management Act 7 of 2007 and EIA Regulations of February 2012, this is summarised below:

6.1 FIRST ROUND CONSULTATION

6.1.1 Inception Meeting

The ESIA project team (as outlined in Table 1) held a project commencement inception meeting on 28 August 2025 via Microsoft Teams.

The purpose of the meeting was twofold:

- For the team members to formally introduce themselves, and
- For the EAP to gain a clear understanding of the proponent's requirements and expectations for the study.

6.1.2 Background Information Document

As part of the ESIA process, Lana Consultancy prepared and distributed a BID to identified key stakeholders. The BID provides a non-technical overview of the proposed Gibeon Upgrade Project, including its purpose, scope, and anticipated benefits. It also outlines the ESIA process, associated legal requirements, and opportunities for stakeholder participation.

- The BID serves as an important engagement tool to:
    - Inform stakeholders about the project in clear and accessible language;
    - Create transparency regarding the assessment process;
    - Provide a basis for discussion during consultation meetings; and
    - Capture initial feedback, issues, and concerns from affected and interested parties.

This ensures that stakeholders are adequately informed and able to contribute meaningfully to the ESIA process.

6.1.3 I&APs Invitation and Consultation

The public advertisements (Figure 19) providing brief information about the proposed project and an invitation to the public meeting was advertised in two local newspapers namely, The Namibia (on 06 and 16 September 2025) and New Era on (10 and 16 September 2025). Additionally, several public notices were also displayed at several public places (Gibeon Village Council, Gibeon Constituency Office, Gibeon Community Hall) in Gibeon and the NamWater premises. In line with Section 3.4 (11) of the EIA Regulations of February 2012,

I&APs were given 21 days to request for a background information document and submit comments by 03 October 2025.

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NOTICE FOR PUBLIC PARTICIPATION

Environmental and Social Impact Assessment and Environmental and Social Management Plan for the Gibeon Upgrade Project

Notice is hereby given to all potential Interested and Affected Parties (I&APs) that an application for an Environmental Clearance Certificate will be submitted to the Environmental Commissioner in terms of the Environmental Impact Assessment Regulations (GN 30 of February 2012): Environmental Management Act, 2007 (Act No. 7 of 2007).

Activity: Gibeon Scheme Upgrade: construction, operation, maintenance, and decommissioning of the proposed 53.3 km pipeline replacement.

Location: Gibeon, Hardap Region.
Proponent: Namibia Water Corporation (NamWater) Ltd.

Description: The proposed upgrade project entails:
• A 53.3 km full pipeline replacement to ensure long-term system efficiency.
• The new pipeline will run parallel to the existing pipeline between Gibeon and Farm Orab.

Public Consultation Meeting:

Details of the upcoming engagement session are provided below.
Date: Tuesday, 23rd of September 2025
Time: 11:00. **Venue**: Gibeon Village Council

All I&APs are hereby invited to register for the project, attend the public meeting and submit comments, questions or concerns in writing to Lana Environmental Consulting.

Email: lanaconsultingcc@gmail.com
Mobile: +264 81 124 590 5
Due **Date: 03 October 2025**

NAMWATER
LANA ENVIRONMENTAL
CLA025 2628

Figure 19: Newspaper advert and site notice

6.1.4 Consultation meeting with Gibeon Village Council

The consultation meeting with the Gibeon Village Council was held on 22 September 2025 at the Council offices. Attendees included the acting Chief Executive Officer (CEO) and staff members from relevant divisions.

The main purpose of the meeting was to:

- Present and discuss the Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management Plan (ESMP) requirements for the proposed Gibeon Upgrade Project.
- Explain the purpose of the consultants' visit.
- Confirm the legal requirement for conducting the ESIA.
- Plan for subsequent community consultations.
- Securing Free, Prior, and Informed Consent (FPIC).

The meeting concluded with a mutual understanding of the ESIA process and the collaborative roles of the Village Council, NamWater, and Lana Consultants in ensuring both compliance and effective community participation. The Acting CEO further instructed his team to mobilize the community by announcing the upcoming consultation meeting through a public address system (speaker). The summary of key issues and agreed action are presented in Table 13.

Table 13: Key Issues and agreed actions at consultation meeting with Gibeon Village Council

Key Issues Discussed	Agreed Actions
Project Introduction – Lana Consultants outlined the purpose of the ESIA/ESMP, confirming it is a statutory requirement before project implementation.	Village Council acknowledged the ESIA as a legal requirement and agreed to support the process.
Public Consultation – Need for a public meeting to inform the community and gather input.	Acting CEO approved the public consultation. Village Council staff to mobilize the community using a public address system (speaker).
Notification – Prior email notification had been sent two weeks before the meeting.	Acting CEO confirmed receipt and endorsed the consultation schedule.
Technical Support – Requirement for site survey assistance and technical inputs on the pipeline.	Assistant Technical Manager assigned to support consultants with the site survey and technical information. NamWater personnel to provide technical input on the pipeline component.

6.1.5 Public Meeting

A public consultation meeting was held on 23 September 2025, Gibeon Community Hall at 11:00. The meeting was attended by representatives of chairpersons of farms along the pipeline route, the directorate of Rural Water Supply as well as by the Gibeon residents (

Figure 20). During the meeting, the EAP introduced the project to the attendees and allowed them to ask questions and give their comments regarding the proposed project. Meeting was also part of securing FPIC from the community.

Figure 20: View of the public meeting

Summary of Community Concerns and Responses raised at the public consultation meeting are presented in Table 14.

Table 14: Summary of Community Concerns and Responses – Public Consultation Meeting

Thematic Area	Key Issues / Concerns Raised	Responses Provided by LANA Consultancy
1. Employment and Economic Opportunities	• Request for priority recruitment of local labour. • Concern that employment should not only focus on the youth but also on the 36–59 age group with relevant skills.	• Input will be documented and forwarded to NamWater for consideration in Contractor requirements. • LANA noted that both youth and older skilled workers will be highlighted in the report to ensure inclusive opportunities.
2. Water Access and Infrastructure	• Request for **water meters to be shifted** to the other side of the road for easier access. • Locked water meters prevent households from monitoring usage. • Concern over responsibility for water losses caused by pipeline breakages.	• Concern will be recommended for review during project design. Access restrictions will be raised with NamWater for corrective measures. • Clarified that communities are only liable for leaks on their property/meter lines; bulk pipeline breakages remain NamWater's responsibility.
3. Water Tariffs and Payment Systems	• Clarification sought on whether the new pipeline would result in cheaper water tariffs. • Request for prepaid water systems to reduce accumulation of debts. • Elderly members struggle with distance to payment points. • Concern about unfair billing – some pay regularly while others default.	• Clarified that pipeline replacement will not affect water pricing; its purpose is reliability. • Request for prepaid systems recorded and will be integrated as a social recommendation. • Elderly challenges noted; prepaid system could address this issue. • Concern on billing equity recorded for NamWater's review.
4. Project Justification and Past Experiences	Acknowledgement that pipeline breakages have been raised before and welcomed the project.	LANA confirmed that the new pipeline project directly addresses this long-standing issue.

The public consultation meeting provided a valuable platform for community members to raise concerns and suggestions regarding the proposed Gibeon Upgrade Project. All issues were addressed directly by LANA Consultancy, in the absence of NamWater's technical team, and were recorded as part of this ESIA and ESMP report.

The concerns and recommended actions have been formally captured and will inform project planning and implementation to ensure that the upgrade not only improves water supply reliability but also responds to the socio-economic and environmental needs of the Gibeon community. The community was reminded that the project's ultimate goal is to enhance water supply reliability in Gibeon and surrounding areas.

6.1.6 Consultation with owners of private farms

Consultation with the owners of the four commercial farms—Orab North, Orab South, Sonnerau, and Jakkels Fountain—was undertaken through telephone calls, SMS messages, and email correspondence, as contact details only became available after the public consultation meeting.

Farm owners were contacted telephonically to explain the project and to request their email addresses. Where calls were not answered, SMS messages were sent providing a brief description of the project and requesting contact details. Two of the farm owners responded and provided their email addresses. The Background Information Document (BID) was subsequently emailed to them, and they were included in the register of Interested and Affected Parties.

The remaining two farm owners did not respond to the SMS messages sent during the consultation period. Section 7.1.2 (Proposed Mitigation Measures during the Planning and Design Phase) of the ESMP (Annexure C) therefore recommends that all affected farm owners be engaged prior to commencement of the project, to ensure they are adequately informed and afforded an opportunity to raise any concerns.

6.2 SECOND ROUND OF CONSULTATION

During the second round of consultation, registered Interested and Affected Parties (I&APs) and relevant authorities were afforded the opportunity to submit comments on the Draft Scoping Report, in accordance with the 7-day commenting period prescribed by the EIA Regulations.

Notification emails were issued to all identified and registered I&APs on 01 February 2026, informing them of the availability of the Draft Scoping Report and inviting written comments by 09 February 2026.

No comments were received during the prescribed commenting period.

6.2.1 Proof of stakeholder consultation process

The proof of the above consultations is contained in Appendix B of this report. These records provide evidence of compliance with stakeholder engagement requirements and include the following:

- Copies of newspaper advertisements (x4) announcing the project and consultation meetings.
- Stakeholder database compiled for the project.
- Minutes and attendance register for the consultation meeting with the Gibeon Village Council.
- Free, Prior, and Informed Consent (FPIC) from the Gibeon Village Council.
- Minutes and attendance register for the public consultation meeting held with the Gibeon community.
- Free, Prior, and Informed Consent (FPIC) forms signed by chairpersons of farms along the pipeline route.

- Proof of consultation with commercial farms through SMS
- The Background Information Document (BID) distributed to stakeholders.
- A notification email informing all pre-identified and registered I&APs of the availability of the Draft Scoping Report and request for comment.

7 DESCRIPTION AND ASSESSMENT OF ANTICIPATED IMPACTS

This chapter provides the anticipated environmental and social impacts associated with the planning, construction, operation, maintenance, and eventual decommissioning of the proposed Gibeon Upgrade Project. While some impacts are straightforward to predict, others are less certain and may change as the project develops, highlighting the importance of continuous monitoring throughout all phases. All activities have the potential to affect the local environment to some degree, particularly fauna, flora, and land use.

The purpose of this section is to identify the most pertinent impacts and assess them in terms of magnitude, duration, reversibility, spatial extent, likelihood, and significance. In line with the EIA Regulations, the assessment considers both the natural and human environments, with attention to the existing socio-economic setting, biophysical conditions, and future land-use and development in the Gibeon area. Mitigation measures are proposed to minimise negative impacts and enhance positive outcomes. The application of the mitigation hierarchy is therefore an essential tool to guide impact management throughout the project life cycle.

7.1 MITIGATIOIN HIERACHY

The mitigation hierarchy applies throughout a project's life cycle, from early planning and design, through to construction, operations and eventual decommissioning and repowering.

The mitigation hierarchy comprises the following steps:

- **Avoidance** is based on measures to anticipate and prevent the creation of impacts. Biodiversity risks need to be identified early in the project planning stages. Effective avoidance can occur through site selection (to ensure projects are not located in areas of high risk), project design (to locate infrastructure and select designs that avoid impacts) and scheduling (to ensure the timing of project activities is favourable for biodiversity).
- **Minimisation** refers to measures taken to reduce the duration, intensity and/or extent of impacts that cannot be completely avoided, as far as is practically feasible. Potential minimisation measures can be identified during early planning, and when developing design alternatives to be considered. Measures to minimise impacts can be applied throughout the project cycle.

  Minimisation actions fall into three broad categories:

  - **Physical controls:** adapting the physical design of project infrastructure to reduce potential impacts such as reducing habitat fragmentation through the installation of culverts or installing bird flight diverters on power lines.
  - **Operational controls:** measures taken to manage and regulate the actions of people, including project staff and Contractors, such as restricting access to sensitive sites within the project area.
  - **Abatement controls:** steps taken to reduce levels of pollutants (e.g. light, noise, gases or liquids) that could have negative biodiversity impacts.

- **Restoration** refers to measures that aim to repair specific biodiversity features or ecosystem services damaged by project impacts that could not be completely avoided or minimised. Restoration is typically undertaken either during construction, or towards the end of a project as part of decommissioning and/or repowering.
- **Offsets** are measures to compensate for significant adverse residual impacts that cannot be avoided, minimised or restored. Offsets involve positive conservation interventions to generate biodiversity gains either through **avoided loss** (addressing threats to prevent predicted biodiversity loss) or **restoration** (for example, improving the quality of degraded habitat). Offsets can be complex and expensive to implement. Fortunately, most projects can usually avoid the need for offsets through careful siting and effective minimisation measures that reduce residual impacts to negligible levels.

7.2 PREDICTION OF IMPACTS

Potential sensitivities within the biophysical and socio-economic environment were screened based on impacts identified through desktop literature review, on-site field assessments, and consultations with stakeholders and community members during public meetings. This process enabled the assessment and identification of the most pertinent environmental and social impacts associated with the proposed Gibeon Upgrade Project. The assessment considers the construction, operational, and eventual decommissioning phases, with impacts evaluated in terms of their magnitude, duration, reversibility, and significance, and with mitigation measures proposed to minimise potential negative effects.

Construction Phase

- Soil disturbance and erosion due to excavation, trenching, and backfilling.
- Vegetation clearance within the servitude, with minor loss of grasses and shrubs; nearby protected species (*Boscia albitrunca*, *Vachellia erioloba*) and *Aloe viridiflora* stands will be avoided.
- Disturbance to fauna, mainly short-term displacement of small mammals, reptiles, and birds from noise and vehicle movement.
- Water quality risks if fuel, oils, or waste are mismanaged at construction sites.
- Community and occupational health and safety risks, including accidents near settlements and traffic hazards along farm roads.
- Fire hazards, as a possible risk arising from fuel storage, hot works, or accidental ignition during construction. Such risks are expected to be low and controllable with proper safety measures.
- Social risks linked to the presence of external construction workers, e.g. potential for social tension, GBV, or communicable diseases.
- Employment opportunities for local communities during construction (positive impact).

Operational Phase

- Improved water supply reliability
- Enhanced socio-economic resilience

- No significant long-term impacts on flora and fauna
- Reduced maintenance disruptions
- Economic Prosperity through Improved Water Security
- Theft and Vandalism of Pipeline Infrastructure

Decommissioning Phase

- Localised disturbance from dismantling infrastructure and reinstating sites, similar in nature to construction but of shorter duration.
- Potential waste generation from decommissioned materials.
- Opportunity to rehabilitate sites, restore disturbed areas, and leave the land in a stable condition.

7.3 CRITERIA FOR IMPACT EVALUATION

As per the NamWater ToR, the following impact assessment for each project phase will be used:

- Positive, negative;
- Nature of impact – temporary, permanent; reversible/irreversible; synergistic, antagonistic, cumulative;
- Magnitude and scale
- Sphere of influence/impact;
- Duration – once-off, construction, life of project, persistent;
- Probability of occurrence;
- Significance;
- Confidence limits;
- Residual impact – after mitigation applied;
- Comparative evaluation of alternatives;
- Cumulative impacts;
- Relate to stakeholder concerns.

The following Impact Assessment Methodology (Table 15), determining consequence and significance are used:

Table 15: Impact Assessment Methodology

Criteria	Description
Risk Event	The type of effect that a proposed activity may have on the environment. A narrative of the impact: *what is affected and how*.
Nature of Impact	Temporary or permanent; reversible or irreversible; synergistic, antagonistic, or cumulative.
Status of Impact	• Positive (beneficial) • Negative (adverse) • Neutral (no overall change).
Magnitude and Scale	Geographic extent of the impact: • Site-specific (pipeline servitude) • Sub-local (0.5–1 km radius) • Local (≤15 km); Regional (Hardap Region); National (Namibia) • International (beyond Namibia).
Sphere of Influence / Impact	• No lasting effect (functions intact). • Minor effects (functions modified). • Moderate effects (functions temporarily cease). • Serious effects (functions permanently cease or exceed legal standards).
Duration	• Once-off; • Construction phase only; • Life of project; • Persistent.
Probability of Occurrence	• Improbable (low likelihood) • Probable (distinct possibility) • Highly probable (most likely) • Definite (will occur regardless of prevention)
Significance (no mitigation)	• None (no significant impact) • Low (localised/temporary; no design change needed) • Medium (moderate; may require design modification) • High (long-term/regional; may imply “no-go” unless mitigated).

Criteria	Description
Confidence Limits	Degree of confidence in predictions: • Low • Medium • High (based on data and specialist knowledge).
Recommended Mitigation	Description of measures to avoid, minimise, manage, or offset the impact.
Residual Impact (after mitigation)	• None • Low (localised/temporary; manageable) • Medium (moderate; requires additional measures) • High (significant; could imply “no-go” unless addressed).
Comparative Evaluation of Alternatives	Considers design or alignment alternatives to reduce or avoid impacts.
Cumulative Impacts	Whether the impact contributes to broader combined effects in the region.
Related to Stakeholder Concerns	Yes – Raised by stakeholders No – Not raised by stakeholders.

7.4 POTENTIAL IMPACTS ASSESSMENT

The purpose of this section is to assess and identify the most pertinent environmental and socio-economic impacts by describing certain quantifiable aspects of these impacts and to provide possible mitigation measures to minimise the magnitude of the impacts that would be expected from the construction, operations and decommissioning of the proposed new water pipeline.

The following aspects and impacts are grouped according to the main project phases, i.e. the planning and design phase, construction phase, operational phase and decommissioning and closure phase. The numerous aspects of each will be discussed under each impact.

7.4.1 The methodology used for mitigation measures

There is a hierarchy of actions which can be undertaken to respond to any proposed project or activity. These cover avoidance, minimisation and compensation. It is possible and considered sought after to enhance the environment by ensuring that positive gains are included in the proposed activity or project. If negative impacts occur, then the hierarchy indicates the following steps:

- Impact avoidance: This step is the most effective when applied at an early stage of project planning. It can be achieved by:
    - not undertaking certain actions or elements that could result in adverse impacts;
    - avoiding environmentally sensitive areas; and
    - putting in place preventative measures to stop adverse impacts from occurring.
- Impact minimisation: This step is usually taken during impact identification and prediction to limit or reduce the degree, extent, magnitude, or duration of adverse impacts. It can be achieved by:
    - scaling down or relocating the proposed activities/project;
    - redesigning elements of the project; and
    - implementing mitigation measures to manage the impacts.
- Impact compensation: This step is usually applied to remedy unavoidable residual adverse impacts. It can be achieved by:
    - rehabilitation of the affected site or environment, for example, by habitat enhancement;
    - restoration of the affected site or environment to its previous state or better; and
    - replacement of the same resource values at another location (offset), for example, by wetland engineering to provide an equivalent area to that lost to drainage or infill.

7.5 POTENTIAL IMPACTS INDENTIFIED FOR EACH PHASE

For this assessment's purpose, the issues and impacts identified are grouped according to the main project phases – i.e., the construction phase, the operational phase and decommissioning and closure phase. Sections following here below 7.5.1 to 7.6.1 give a broad overview of each potential impact expected during the three phases, while a comprehensive assessment outcome with mitigations is presented for each potential impact.

7.5.1 Planning and Design Phase

The first step in avoiding and preventing any possible negative impacts during the construction, operation, maintenance, and decommissioning phases begins at the **planning and design phase**. This stage includes the drafting of the water pipeline design plan, surveying activities, and selection of the pipeline route before construction commences. Issues to be considered during this phase are not necessarily assessed according to the formal impact assessment criteria but remain important in ensuring that future risks are avoided or minimised.

7.5.1.1 Pipeline exposure at drainage crossings

During site inspections, it was observed that some sections of the existing pipeline are exposed at drainage channels and ephemeral tributaries due to weathering and erosion (see Figure 21 - A). While gabion structures have been installed in certain locations to protect the pipeline (Figure 21 - B), they do not cover all vulnerable points. The design team should therefore take cognisance of this issue and incorporate adequate protection measures, such as extending gabion installations, to safeguard the new pipeline from similar exposure.

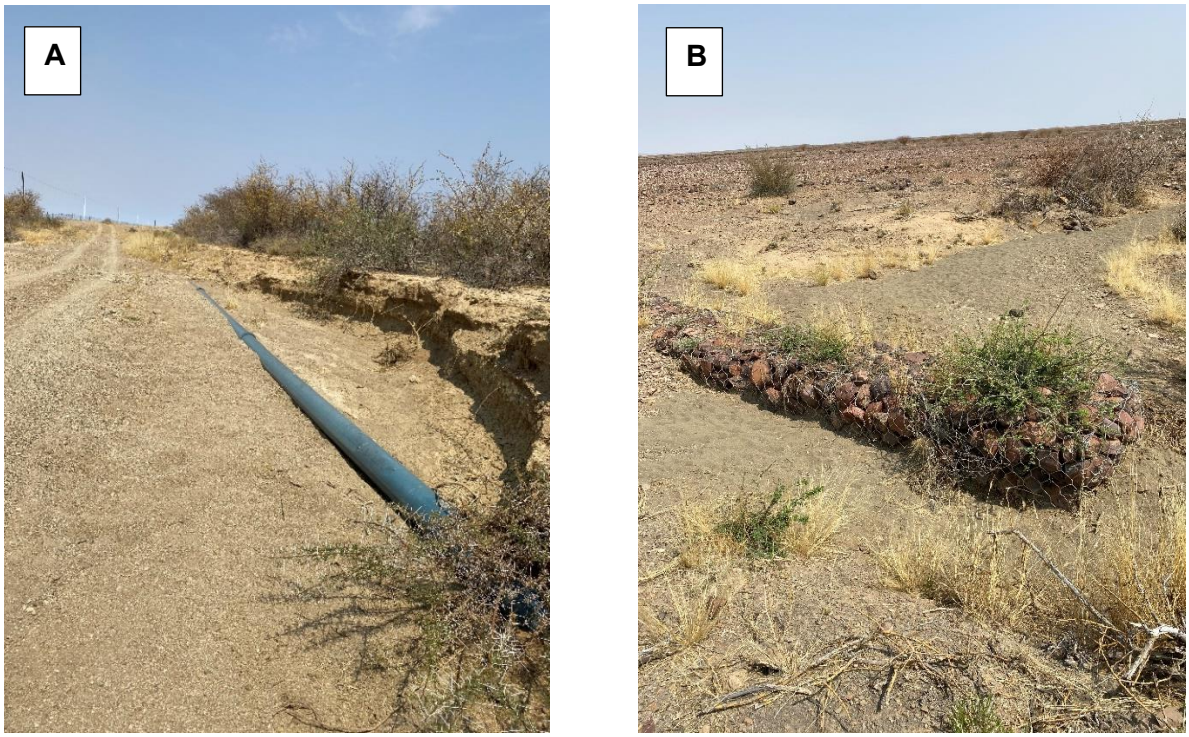

Figure 21:A - Exposed pipeline section at a drainage channel due to erosion and weathering; B - Gabion structure installed to protect the pipeline crossing at a drainage line, though not all tributaries along the route are adequately covered.

Table 16: Pipeline exposure at drainage lines and ephemeral tributaries

Criteria	Assessment
Risk Event	Pipeline exposure caused by erosion and weathering at drainage lines and ephemeral tributaries, leading to damage or increased maintenance needs.
Nature of Impact	Negative; physical disturbance to infrastructure.
Status of Impact	Negative.
Magnitude and Scale	Site-specific to sub-local (limited to pipeline crossings at drainage lines and tributaries).
Sphere of Influence / Impact	Minor to moderate – potential localised infrastructure damage.
Duration	Long-term if not mitigated (pipeline lifespan).
Probability of Occurrence	Probable – based on current exposure observed on the existing pipeline.
Significance (no mitigation)	Medium.
Confidence Limits	High – supported by site inspection evidence.
Recommended Mitigation	• Incorporate erosion-control measures at all drainage and tributary crossings during design. • Install gabion mattresses, culverts, or reinforced bedding as appropriate. • Conduct regular inspections of crossings during operation to ensure protection remains intact.
Residual Impact (after mitigation)	Low – if design provisions are implemented.
Comparative Evaluation of Alternatives	Leaving crossings unprotected would lead to recurring exposure; engineered protection is preferred.
Cumulative Impacts	Reduced long-term maintenance and repair requirements; improves sustainability of the scheme.
Related to Stakeholder Concerns	Yes – issue identified during site reconnaissance.

7.5.1.2 Provision offtakes on the new pipeline

The existing pipeline has off-take connections to farms situated on the opposite side of the B1 road. Farmers and stakeholders expressed concern during authority and public meetings that they would prefer their water meters to be placed on the same side of the road as their properties to improve access and reduce safety risks associated with crossing the national road.

Recommended Mitigation Measures:

- NamWater should incorporate provisions for off-takes in the design of the new pipeline.
- These provisions should cater for both existing customers who wish to relocate their water meters and future new customers (such as villagers or farmers) located closer to the new pipeline alignment.
- All off-take designs should consider road safety, accessibility, and long-term maintenance requirements.

7.5.2 Construction Phase Impact Assessment

Potential effects on the environment during the installation activities of the proposed Gibeon Upgrade Project are expected to be low to moderate and largely temporary in nature. Dust may be generated during excavation and trenching works, while noise levels are likely to increase due to the operation of heavy machinery and vehicle movement. Some solid waste will also be generated during construction, and its proper removal and disposal will be the responsibility of the Contractor.

The most significant potential impacts identified during the construction phase relate to the disturbance of soil, vegetation, and local biodiversity within the servitude. With regard to water supply, the existing pipeline will remain in situ and functional throughout construction, and only a short-term disruption may occur during the switchover period once the new pipeline is complete. These impacts are therefore expected to be short-lived and can be mitigated through the application of strict environmental and safety protocols, as detailed in the Environmental and Social Management Plan (ESMP).

Potential construction-related impacts on the environment and their recommended mitigation measures are presented in Table 17 to Table 28.

The anticipated potential negative impacts during the construction phase of the proposed pipeline will affect both the biophysical and socio-economic environments as follows:

Biophysical Impacts

- Soil disturbance and erosion
- Dust and emissions
- Habitat destruction and loss of flora
- Loss of plants or plant parts due to illegal collection for trade
- Contamination from bulk earthworks and civil works
- Disturbance to local fauna
- Pipeline trench acting as pitfalls
- Waste generation
- Risk of fuel and lubricant spills/leaks

Socio-economic and Cultural Impacts:

- Social risks – migrant construction workers and the danger of HIV/AIDS, GBV, Sexual Exploitation, Abuse, and Sexual Harassment (SEASH) and informal settlements
- Community and occupational health and safety
- Heritage impacts
- Employment opportunities (positive impact)

7.5.2.1.1 Soil disturbance and erosion

Table 17: Soil Disturbance and Erosion

Criteria	Assessment
Risk Event	Soil disturbance and erosion due to excavation, trenching, and backfilling.
Nature of Impact	Temporary; reversible; may contribute cumulatively if poorly managed.
Status of Impact	Negative (adverse).
Magnitude and Scale	Site-specific (pipeline servitude).
Sphere of Influence / Impact	Minor effects (environmental functions modified but intact).
Duration	Construction phase only.
Probability of Occurrence	Probable (distinct possibility).
Significance (no mitigation)	Medium – potential for localised soil loss, trench instability, and erosion.
Confidence Limits	High – based on field experience and similar pipeline projects.
Recommended Mitigation	Restrict excavation to servitude; stockpile and reuse topsoil; stabilise slopes; progressive backfilling; avoid works in heavy rain.
Residual Impact (after mitigation)	Low – impacts will be localised and short-term with proper mitigation.
Comparative Evaluation of Alternatives	No alternative alignment required, as impacts can be managed within the existing servitude.
Cumulative Impacts	Possible minor contribution to cumulative land disturbance in the region.
Related to Stakeholder Concerns	No – not specifically raised by stakeholders.

7.5.2.1.2 Dust and emissions

Table 18: Dust and emissions

Criteria	Assessment
Risk Event	Dust generation from excavation and release of fumes and noxious gases (hydrocarbon vapours, carbon monoxide, sulphur oxides) from vehicles and construction equipment.
Nature of Impact	Temporary; reversible.
Status of Impact	Negative.
Magnitude and Scale	Sub-local (up to 1 km); unlikely to affect sensitive receptors due to distance from residential areas.
Sphere of Influence / Impact	Minor effects – air quality functions slightly modified but not impaired.
Duration	Construction phase only; short-term.
Probability	Highly probable for dust; probable for fumes/gases.
Significance (no mitigation)	Low–Medium; expected to be insignificant given remoteness from settlements.
Confidence Limits	High – supported by baseline conditions and distance from receptors.
Mitigation	Regular watering of exposed surfaces; maintain and service equipment to reduce emissions; enforce vehicle speed limits; avoid idling of machinery.
Residual Impact (after mitigation)	Low – impacts localised, temporary, and not expected to affect communities.
Alternatives	N/A.
Cumulative	Minor contribution to regional background air quality.
Stakeholder Concerns	Yes – dust raised in community meetings, fumes not specifically raised.

7.5.2.1.3 Habitat destruction and disturbance and loss of flora

Table 19: Habitat destruction and disturbance and loss of flora

Criteria	Assessment
Risk Event	Habitat destruction and loss of flora within the servitude, mainly affecting grasses and shrubs. Protected species such as *Boscia albitrunca* (shepherd's tree), *Vachellia erioloba* (camelthorn), and *Aloe viridiflora* occur nearby but are outside the construction footprint.
Nature of Impact	Temporary; reversible.
Status of Impact	Negative.
Magnitude and Scale	Site-specific (pipeline servitude).
Sphere of Influence / Impact	Minor effects – limited vegetation disturbance in already modified corridor.
Duration	Construction phase only.
Probability	Improbable – loss of protected species highly unlikely since they are outside the servitude and Aloe is >10 m away.
Significance (no mitigation)	Low.
Confidence Limits	High – supported by site inspection records.
Mitigation	Confine disturbance strictly to servitude; avoid marked protected trees and Aloe stands; train workers not to cut, lean on, or remove plants. Environmental awareness protocols to be enforced.
Residual Impact (after mitigation)	None–Low.
Alternatives	N/A – route alignment already minimises impact.
Cumulative	Negligible.
Stakeholder Concerns	No – not specifically raised by stakeholders.

7.5.2.1.4 Loss of plants or plant parts due to illegal collection for trade

Table 20: Loss of plants or plant parts due to illegal collection for trade

Criteria	Assessment
Risk Event	Loss of plants or plant parts through illegal collection for trade, particularly affecting succulents and protected species of potential economic value.
Nature of Impact	Permanent if plants are removed; reversible if prevented.
Status of Impact	Negative.
Magnitude and Scale	Site-specific (pipeline servitude and immediate vicinity).
Sphere of Influence / Impact	Minor effects – individual plants may be lost, but ecosystem functions remain intact.
Duration	Construction phase only; risk is linked to presence of external workers.
Probability of Occurrence	Improbable if strict controls are enforced; otherwise, probable.
Significance (no mitigation)	Medium – loss of protected or endemic plants may have ecological and legal implications.
Confidence Limits	Medium – based on likelihood observed in other infrastructure projects.
Recommended Mitigation	Prohibit workers from harvesting or removing plants; enforce environmental code of conduct; awareness training on plant protection laws; supervision and spot checks by Environmental Officer.
Residual Impact (after mitigation)	None–Low – risk effectively eliminated with enforcement.
Comparative Evaluation of Alternatives	Not applicable, as this risk is behavioural rather than design related.
Cumulative Impacts	Low – minimal contribution to broader flora disturbance if controlled.
Related to Stakeholder Concerns	No – not specifically raised during consultations.

7.5.2.1.5 Disturbance to local Fauna

Table 21: Disturbance to local Fauna

Criteria	Assessment
Risk Event	Disturbance and displacement of local fauna (mammals, reptiles, birds) due to construction noise, movement of vehicles and machinery, and human presence.
Nature of Impact	Temporary; reversible.
Status of Impact	Negative.
Magnitude and Scale	Site-specific (servitude and immediate vicinity).
Sphere of Influence / Impact	Minor effects – animals may avoid construction areas but will return once activities cease.
Duration	Construction phase only.
Probability of Occurrence	Probable.
Significance (no mitigation)	Low–Medium – short-term stress and displacement but no lasting impacts.
Confidence Limits	Medium – based on typical impacts observed in similar pipeline projects.
Recommended Mitigation	Limit construction to daylight hours; impose strict speed limits; prohibit hunting or harassment of animals; provide awareness training to workers.
Residual Impact (after mitigation)	Low.
Comparative Evaluation of Alternatives	N/A – alignment within existing disturbed servitude already reduces habitat disturbance.
Cumulative Impacts	Negligible – no significant contribution to regional fauna decline.
Related to Stakeholder Concerns	No – not specifically raised during public consultations.

7.5.2.1.6 Pipeline trench act as pitfall

Table 22: Pipeline trench act as pitfall

Criteria	Assessment
Risk Event	Open pipeline trenches acting as pitfalls for small mammals, reptiles, amphibians, or ground-nesting birds during construction.
Nature of Impact	Temporary; reversible if animals are rescued. Could be permanent if mortality occurs.
Status of Impact	Negative.
Magnitude and Scale	Site-specific (construction servitude).
Sphere of Influence / Impact	Minor–Moderate effects – isolated mortality possible but unlikely to affect population-level functions.
Duration	Construction phase only.
Probability of Occurrence	Probable if trenches are left open and unprotected.
Significance (no mitigation)	Medium.
Confidence Limits	Medium – based on known risks in linear trenching projects.
Recommended Mitigation	Keep trenches open only for the shortest possible time; where necessary, install escape ramps at intervals; inspect trenches daily; rescue and release trapped animals; environmental officer to monitor.
Residual Impact (after mitigation)	Low – risk substantially reduced if mitigation applied.
Comparative Evaluation of Alternatives	N/A – relates to construction method, not route.
Cumulative Impacts	Negligible – localised and temporary.
Related to Stakeholder Concerns	No – not specifically raised during consultations.

7.5.2.1.7 Waste generation

During the construction phase, relatively small volumes of waste will be generated. This includes domestic waste (non-hazardous), industrial non-hazardous waste (such as offcuts, scrap metal, empty containers, plastics, packaging, and building rubble), and industrial hazardous waste (e.g., hydrocarbon-contaminated soil or materials). In addition, sewerage waste will be produced by the construction crew. Without proper facilities, this may result in localised run-off, unpleasant odours, and unhygienic conditions, though the volumes are expected to be limited due to the small crew size.

If not properly managed, these different types of waste could negatively affect the surrounding environment through littering, pollution, odours, and aesthetic impacts. With strict adherence to waste management protocols—including segregation, recycling, provision of portable

ablution facilities, proper storage, and regular disposal at approved facilities such as the municipal wastewater treatment plant—the impacts are expected to be localised, temporary, and low in significance.

The impact assessment table below provides a summary of anticipated impacts and mitigation measures for all forms of waste, including sewerage waste, during the construction phase.

Table 23: Waste Generation (including Sewerage Waste)

Criteria	Assessment
Risk Event	Waste will be generated during the construction phase, including domestic waste (non-hazardous), industrial non-hazardous waste (e.g. offcuts, scrap metal, empty containers, packaging, building rubble), industrial hazardous waste (e.g. hydrocarbon-contaminated materials), and sewerage waste from construction crews. Without proper management, this may result in localised run-off, odours, littering, pollution, and reduced visual amenity.
Nature of Impact	Temporary; reversible; localised.
Status of Impact	Negative – if waste is not properly managed.
Magnitude and Scale	Site-specific (pipeline servitude, camps, and work areas).
Sphere of Influence / Impact	Minor to moderate effects – depending on crew size and management measures.
Duration	Short-term, limited to construction.
Probability of Occurrence	Probable.
Significance (no mitigation)	Medium – especially if hazardous or sewerage waste is unmanaged.
Confidence Limits	High – waste impacts are well understood.
Recommended Mitigation Measures	• Segregate waste at source into domestic, recyclable, and hazardous. • Ensure regular collection and disposal at approved facilities. • Recycle or reuse materials where feasible. • Provide portable ablution facilities in line with GN 121 of 1969 (at least 1 toilet every 500m along the route, and 2 toilets per 25 people, separate for males and females). • Contain sewage in septic tanks and dispose at the municipal wastewater treatment plant. • Train construction staff in proper waste handling and hygiene practices.
Residual Impact (after mitigation)	Low – impacts will be localised and temporary with proper management.
Comparative Evaluation of Alternatives	No alternatives – proper waste management and sanitation are required.
Cumulative Impacts	Minimal if waste is properly disposed of and ablution facilities are well maintained.

Criteria	Assessment
Related to Stakeholder Concerns	Not directly raised, but proper sanitation and waste management are standard requirements for construction projects.

7.5.2.1.8 Risk of fuel and lubricants spill or leaks at construction, refuelling, and storage sites

Table 24: Risk of fuel and lubricants spill or leaks at construction, refuelling, and storage sites

Criteria	Assessment
Risk Event	Poor handling and spillage of fuel, lubricants, and chemicals (oil, grease) from construction vehicles, refuelling, or storage, which could contaminate soil, surface water, and groundwater.
Nature of Impact	Temporary if contained quickly; potentially permanent if not managed.
Status of Impact	Negative.
Magnitude and Scale	Site-specific, with possible sub-local impacts if contamination spreads beyond the immediate site.
Sphere of Influence / Impact	Moderate effects – contamination may alter soil properties, water quality, and affect nearby ecosystems.
Duration	Construction phase only; impacts may persist if remediation is not undertaken.
Probability of Occurrence	Probable without controls; improbable with strict management.
Significance (no mitigation)	Medium–High, depending on volume and response time.
Confidence Limits	Medium – based on evidence from similar construction projects.
Recommended Mitigation	Store fuels in bunded areas; use drip trays during refuelling; prohibit refuelling near water points; maintain spill kits onsite; train workers in spill prevention and emergency response; immediate clean-up of any leaks or spills.
Residual Impact (after mitigation)	Low – with effective measures, impacts remain localised and short-term.
Comparative Evaluation of Alternatives	Not applicable – relates to management practice, not alignment.
Cumulative Impacts	Low – uncontrolled spills may add to regional pollution risks, but effective management prevents cumulative effects.
Related to Stakeholder Concerns	No – not specifically raised, but considered under best environmental practice.

7.5.2.1.9 Social Risk

During the construction phase, social risks may arise due to the presence of migrant construction workers and jobseekers from different parts of the country. Such dynamics can contribute to challenges including casual relationships between workers and community members, unplanned pregnancies, Sexual Exploitation, Abuse, and Sexual Harassment (SEASH) and a heightened risk of sexually transmitted diseases such as HIV/AIDS. Large infrastructure projects also tend to attract jobseekers, which may increase the likelihood of informal settlements and their associated problems (e.g., sanitation, waste management, and social tensions). Because the tender will be advertised nationally, the appointed Contractor may employ workers from outside the Hardap Region. However, the Contractor can be encouraged, through contractual provisions, to prioritise local employment where feasible, thereby reducing in-migration and strengthening community benefits. With such measures, these impacts are expected to be moderate and manageable.

Table 25: Social Risks – Migrant Workers, HIV/AIDS, and Informal Settlements

Criteria	Assessment
Risk Event	Influx of migrant workers and jobseekers during construction may lead to casual relationships, SEASH, spread of HIV/AIDS and STIs, unplanned pregnancies, and possible establishment of informal settlements.
Nature of Impact	Temporary; partly reversible with awareness and management.
Status of Impact	Negative.
Magnitude and Scale	Sub-local to local (pipeline route and host communities).
Sphere of Influence / Impact	Moderate – may alter social dynamics and increase pressure on services.
Duration	Construction phase only.
Probability of Occurrence	Probable – open national tender may attract outside labour.
Significance (no mitigation)	Medium.
Confidence Limits	Medium – based on experience from similar projects.
Recommended Mitigation	Encourage Contractor to prioritise local hiring; implement SEASH, HIV/AIDS and STI awareness programmes; enforce a worker Code of Conduct; prohibit establishment of worker camps within settlements; collaborate with local health and social services; monitor and address risks of informal settlements.
Residual Impact (after mitigation)	Low – impacts reduced if Contractor obligations are enforced.
Comparative	Not applicable – relates to workforce management, not design.

Criteria	Assessment
Evaluation of Alternatives	
Cumulative Impacts	Moderate if combined with other regional projects but can be reduced by local hiring.
Related to Stakeholder Concerns	Yes – raised during consultations regarding social risks.

7.5.2.1.10 Community and Occupational Health and Safety

During the construction phase, community and occupational health and safety hazards may arise for both the construction workforce and, indirectly, for nearby community members. Workers are exposed to risks such as injuries from machinery, slips and falls, heat stress, excessive noise, exposure to dust and noxious fumes, and handling of hazardous substances (fuels, lubricants, and chemicals). Indirect risks to community members include accidents along access roads and unsafe interaction with construction equipment if sites are not adequately demarcated. These risks are inherent to construction activities but are generally temporary and manageable. Through the enforcement of community and occupational health and safety standards, provision of appropriate personal protective equipment (PPE), worker training, emergency preparedness plans, erection of warning signs and restricting public access to active work areas, the likelihood and severity of such hazards can be significantly reduced, leaving only a low residual impact.

Table 26: Occupational Health and Safety Hazards

Criteria	Assessment
Risk Event	Occupational health and safety hazards for the construction workforce (injuries from machinery, slips and falls, heat stress, noise, dust/fumes, handling hazardous materials) and indirect risks for nearby community members (accidents along access roads, exposure to unsafe work zones).
Nature of Impact	Temporary; reversible with proper prevention and management.
Status of Impact	Negative.
Magnitude and Scale	Site-specific; sub-local if accidents occur on access roads.
Sphere of Influence / Impact	Moderate – may affect workers directly and communities indirectly.
Duration	Construction phase only.
Probability of Occurrence	Probable – inherent to construction activities.
Significance (no mitigation)	Medium–High – depending on exposure and controls.
Confidence Limits	High – based on common risks in infrastructure construction projects.

Criteria	Assessment
Recommended Mitigation	Enforce community and occupational health and safety standards; provide PPE to all workers; implement toolbox talks and training; maintain first-aid and emergency response plans; demarcate and fence construction areas; speed control on access roads; appoint a dedicated OHS officer.
Residual Impact (after mitigation)	Low – risks reduced significantly with strict controls.
Comparative Evaluation of Alternatives	Not applicable – relates to management approach, not project design.
Cumulative Impacts	Low – unless combined with multiple regional projects employing large labour forces.
Related to Stakeholder Concerns	Yes – raised indirectly as part of community safety issues during consultations.

7.5.2.1.11 Heritage Impact

No formally recorded archaeological or heritage sites are located within the proposed pipeline servitude. The likelihood of encountering significant heritage resources during construction is therefore considered to be low. However, as with all linear infrastructure projects, there remains a small possibility of uncovering previously unknown heritage materials (e.g., stone tools, pottery, graves, or fossil remains) during earthworks and trenching. Such impacts would be permanent and irreversible if not properly managed. With the application of a chance find procedure, worker training, and immediate reporting to the National Heritage Council should any heritage resources be discovered, residual impacts are expected to be **very low**.

Table 27: Heritage Impact

Criteria	Assessment
Risk Event	Possible disturbance or loss of unknown archaeological or heritage resources (artefacts, graves, fossils) during excavation and trenching.
Nature of Impact	Permanent and irreversible if heritage resources are destroyed; reversible if chance finds are managed appropriately.
Status of Impact	Negative.
Magnitude and Scale	Site-specific (pipeline servitude).
Sphere of Influence / Impact	Serious if destruction occurs without reporting; otherwise minor with proper mitigation.
Duration	Once-off events during construction only.
Probability of Occurrence	Improbable – no known sites recorded, but chance finds remain possible.

Criteria	Assessment
Significance (no mitigation)	Medium – permanent loss of heritage value if unmanaged.
Confidence Limits	Medium – based on absence of known records but acknowledging chance finds.
Recommended Mitigation	Implement and enforce a chance find procedure; train workers to recognise heritage materials; stop work immediately upon discovery; notify the National Heritage Council; safeguard the find until authorities provide instructions.
Residual Impact (after mitigation)	Low – impacts can be effectively avoided if chance find procedures are followed.
Comparative Evaluation of Alternatives	Not applicable – pipeline alignment already avoids known sites.
Cumulative Impacts	Negligible – no significant heritage resources identified in the wider area.
Related to Stakeholder Concerns	No – heritage issues were not raised during consultations.

7.5.2.1.12 Employment Opportunities

The construction phase of the Gibeon Upgrade Project will create short-term employment opportunities for both skilled and unskilled workers. While the Contractor will likely bring in specialised staff for technical tasks, there is potential for local recruitment of general labourers, drivers, and support staff. Prioritising local employment can reduce in-migration, strengthen community relations, and provide income to households that are otherwise vulnerable to unemployment. These opportunities are inherently temporary but represent an important positive social benefit for the Gibeon community and surrounding farms.

Table 28: Employment opportunities

Criteria	Assessment
Risk Event	Employment opportunities created during construction, particularly for unskilled and semi-skilled local labour.
Nature of Impact	Temporary; positive.
Status of Impact	Positive.
Magnitude and Scale	Local – benefits will accrue primarily to the Gibeon settlement and surrounding constituency.
Sphere of Influence / Impact	Moderate – short-term income and skills development for households.

Criteria	Assessment
Duration	Construction phase only.
Probability of Occurrence	Definite – employment is required for project delivery.
Significance (no mitigation)	Medium – potential positive benefit.
Confidence Limits	High – based on experience with similar projects.
Recommended Enhancement	Encourage Contractor to prioritise local hiring where feasible; include clauses in tender/contract promoting local labour use; provide basic training and on-the-job skills development.
Residual Impact (after enhancement)	Medium–High – maximised benefit if local recruitment is prioritised.
Comparative Evaluation of Alternatives	N/A – employment is inherent to project implementation.
Cumulative Impacts	Positive – contributes to regional employment and skills.
Related to Stakeholder Concerns	Yes – local employment opportunities were raised during consultations.

7.5.2.1.13 Positive Socio-Economic Impacts

In addition to the temporary environmental and social risks, the Gibeon Upgrade Project is expected to generate positive socio-economic benefits during its construction phase. These include the creation of short-term employment opportunities for both skilled and unskilled workers, with scope for prioritising local recruitment to maximise benefits to households in Gibeon and surrounding farms. The project may also stimulate local procurement of goods and services, such as catering, accommodation, transport, and small supplies, thereby supporting small businesses and informal traders in the area. Although these benefits are temporary in nature, they represent a meaningful contribution to the local economy and can strengthen community support for the project.

7.5.3 Operation Phase Impact Assessment

During the operational phase, certain risks and challenges may arise, mainly linked to maintenance and repair activities, waste generation, and theft or vandalism of infrastructure. These impacts are considered localised, short-term, and manageable through appropriate mitigation measures. The assessment of these potential impacts is summarised in the tables below.

At the same time, the operational phase is expected to generate significant positive impacts, including improved water supply reliability, enhanced socio-economic resilience, reduced maintenance disruptions, long-term economic prosperity through improved water security, and

no significant long-term impacts on flora and fauna once the system is in place. These benefits will support household supply, farming activities, and local development.

The unique operational phase impacts identified for the project are assessed in the following tables, using the same methodology applied in the construction phase. Each impact is evaluated in terms of its nature, significance, duration, probability, and residual effect after mitigation or enhancement.

Potential operation -related impacts on the environment and their recommended mitigation measures are presented in Table 30 to Table 37.

Table 29: Chlorination During Operational Activities

Criteria	Assessment
Risk Event	Operation of the gas chlorination system at the Gibeon reservoir for water disinfection to ensure safe potable water supply.
Nature of Impact	Potentially negative if chlorine gas leaks, spills, or poor maintenance occur; however, positive when effectively managed as it safeguards public health.
Status of Impact	Negative (potential), mitigable.
Magnitude and Scale	Localized – confined to the chlorination building and immediate surroundings at the reservoir site.
Sphere of Influence / Impact	Low–Moderate – improper handling could pose health and safety risks to workers and nearby residents; effective management prevents any off-site impact.
Duration	Long-term – throughout the operational life of the facility.
Probability of Occurrence	Low – provided that maintenance, monitoring, and safety procedures are followed.
Significance (no mitigation)	Medium negative – accidental exposure or leakage could cause health and environmental harm.
Confidence Limits	High – based on established operational experience and standard chlorination practices under NamWater supervision.
Recommended Mitigation / Enhancement Measures	• Ensure chlorination facility complies with the Water Resources Management Regulations, 2023 (Regulations 6–9). • Maintain gas cylinders, dosing equipment, and ventilation systems regularly. • Train operators in chlorine safety, emergency response, and leak detection.• Install leak detectors, alarms, and proper ventilation in the chlorination building. • Maintain Material Safety Data Sheets (MSDS) and PPE for all staff. • Conduct routine safety audits and update emergency response

Criteria	Assessment
	plans annually.
Residual Impact (after mitigation)	Low negative – negligible risk remains under normal operating conditions. Positive contribution to public health through provision of safe drinking water.
Comparative Evaluation of Alternatives	Alternatives (e.g., sodium hypochlorite dosing) may reduce gas handling risks but are less efficient and more costly at current operational scale.
Cumulative Impacts	Positive cumulative effect through continuous provision of treated, safe water, supporting improved community health and reduced disease risk.
Related to Stakeholder Concerns	Yes – aligns with community concerns regarding safe and reliable drinking water supply.

Table 30: Pipeline Maintenance and Repair Activities

Criteria	Assessment
Risk Event	Maintenance and repair activities on the operational pipeline, including inspections and emergency works, may cause localised disturbance from excavation, noise, dust, and restricted access.
Nature of Impact	Temporary; reversible; localised.
Status of Impact	Negative (short-term disturbance) but Positive (ensures functionality and supply reliability).
Magnitude and Scale	Site-specific (within the pipeline servitude).
Sphere of Influence / Impact	Minor effects – temporary alteration of functions.
Duration	Short-term and intermittent during the life of the project.
Probability of Occurrence	Probable.
Significance (no mitigation)	Low.
Confidence Limits	High.
Recommended Mitigation Measures	• Draft and implement Routine/Emergency Maintenance Procedure. • Avoid damaging crops and trees; reinstate land after works. • Request consent if temporary access to private land is required.
Residual Impact (after mitigation)	Low.
Cumulative Impacts	Minimal – impacts are short-lived.
Related to Stakeholder Concerns	Yes – water supply disruptions were raised.

Table 31: Waste Generation during Maintenance and Repair Activities

Criteria	Assessment
Risk Event	Waste may be generated during routine operation, maintenance and repair activities (e.g. packaging, worn fittings, excavated spoil, oily rags, lubricants). If not properly managed, waste can contaminate soil/water and reduce visual amenity.
Nature of Impact	Temporary; reversible; localised.
Status of Impact	Negative.
Magnitude and Scale	Site-specific (servitude and repair sites).
Sphere of Influence / Impact	Minor effects – controllable through proper management.
Duration	Short-term and intermittent.
Probability of Occurrence	Probable.
Significance (no mitigation)	Low to Medium.
Confidence Limits	High.
Recommended Mitigation Measures	• Collect and segregate waste at source. • Dispose at approved sites (hazardous waste via licensed facilities).• Reuse/recycle materials where feasible. • Reinstate land after works. • Train staff on waste handling protocols.
Residual Impact (after mitigation)	Low.
Cumulative Impacts	Minimal – if disposed of properly.
Related to Stakeholder Concerns	No – but waste management is a standard safeguard.

Table 32: Theft and Vandalism of Pipeline Infrastructure

Criteria	Assessment
Risk Event	Theft or vandalism of markers, valves, or other pipeline components can disrupt supply and increase maintenance costs.
Nature of Impact	Temporary; reversible; socio-economic.
Status of Impact	Negative.
Magnitude and Scale	Local to sub-local.
Sphere of Influence / Impact	Minor to moderate effects – disruptions to service.
Duration	Intermittent during operation.
Probability of Occurrence	Probable.
Significance (no mitigation)	Medium.
Confidence Limits	Medium.
Recommended Mitigation Measures	• Regular inspections of servitude. • Community awareness on importance of markers. • Prevent permanent structures within servitude.

	• Draft Routine/Emergency Maintenance Procedure with clear roles.
Residual Impact (after mitigation)	Low.
Cumulative Impacts	Minimal if markers and assets are protected.
Related to Stakeholder Concerns	Yes – raised during community meetings.

Table 33: Improved water supply reliability

Criteria	Assessment
Risk Event	Operation of the new pipeline will provide more reliable bulk water supply to Gibeon settlement and farms.
Nature of Impact	Long-term; positive.
Status of Impact	Positive.
Magnitude and Scale	Local to regional (Gibeon and surrounding farms).
Sphere of Influence / Impact	Moderate–High – reliability improves water security and reduces interruptions.
Duration	Life of project.
Probability of Occurrence	Definite.
Significance (no mitigation)	High – a key positive outcome.
Confidence Limits	High.
Recommended Enhancement	Ensure proactive operation and monitoring of the system; maintain telemetry and SCADA system.
Residual Impact	High positive.
Cumulative Impacts	Positive contribution to regional water security.
Stakeholder Concerns	Yes – raised during community consultations.

Table 34: Enhanced socio-economic resilience

Criteria	Assessment
Risk Event	Improved water supply contributes to greater socio-economic resilience for households, institutions, and farms.
Nature of Impact	Long-term; positive.
Status of Impact	Positive.
Magnitude and Scale	Local to regional.
Sphere of Influence / Impact	Moderate – enables agriculture, businesses, schools, and households to function reliably.
Duration	Life of project.
Probability of Occurrence	Definite.
Significance (no mitigation)	Medium–High.
Confidence Limits	Medium.
Recommended Enhancement	Prioritise local connections; integrate with Directorate of Rural Water Supply to support communal farmers.
Residual Impact	High positive.
Cumulative Impacts	Positive – contributes to economic growth.
Stakeholder Concerns	Yes – livelihood concerns raised during consultations.

Table 35: No Significant Long-Term Impacts on Flora and Fauna

Criteria	Assessment
Risk Event	Operation of the pipeline does not involve major disturbance to flora or fauna.
Nature of Impact	Neutral to minor positive – since no further habitat disturbance occurs after construction.
Status of Impact	Neutral.
Magnitude and Scale	Site-specific.
Sphere of Influence / Impact	No lasting effect.
Duration	Life of project.
Probability of Occurrence	Definite – operation does not harm ecosystems.
Significance (no mitigation)	None–Low.
Confidence Limits	High.
Recommended Mitigation	Routine monitoring; prevent leaks; restrict off-road vehicle use.
Residual Impact	None–Low.
Cumulative Impacts	Negligible.
Stakeholder Concerns	No.

Table 36: Reduced Maintenance Disruptions

Criteria	Assessment
Risk Event	New pipeline reduces frequency of maintenance and water interruptions compared to old pipeline.
Nature of Impact	Long-term; positive.
Status of Impact	Positive.
Magnitude and Scale	Local (settlement and farms).
Sphere of Influence / Impact	Moderate – improved efficiency of NamWater operations.
Duration	Life of project.
Probability of Occurrence	Definite.
Significance (no mitigation)	Medium positive.
Confidence Limits	High.
Recommended Enhancement	Maintain telemetry system; ensure preventative maintenance schedules are followed.
Residual Impact	Medium–High positive.
Cumulative Impacts	Positive – supports regional water reliability.
Stakeholder Concerns	Yes – raised regarding frequent breakages.

Table 37: Economic Prosperity through Improved Water Security

Criteria	Assessment
Risk Event	Improved water security contributes to economic prosperity by supporting agricultural productivity, attracting investment, and enabling local development.
Nature of Impact	Long-term; positive.
Status of Impact	Positive.
Magnitude and Scale	Regional – benefits extend beyond Gibeon to the wider Hardap Region.
Sphere of Influence / Impact	Moderate–High – reliable water supply underpins livelihoods, economic activities, and potential new investments.
Duration	Life of project.
Probability of Occurrence	Probable – water reliability is a key factor in investment decisions.
Significance (no mitigation)	Medium–High positive.
Confidence Limits	Medium – based on logical link between water security and economic activity.
Recommended Enhancement	• Develop and implement a Water Demand Management (WDM) plan to ensure sustainable use of the resource. • Require all major economic activities in the area to align with the WDM plan. • Promote awareness campaigns on water efficiency for households and businesses.
Residual Impact (after enhancement)	High positive – with proper management, water security will sustainably drive long-term prosperity.
Comparative Evaluation of Alternatives	Not applicable – benefit inherent to pipeline operation.
Cumulative Impacts	Strongly positive – contributes to wider economic development at regional and national levels.
Related to Stakeholder Concerns	No – not directly raised, but implicit in concerns about livelihoods and economic opportunities.

With proper implementation of the recommended mitigation measures, the minor and localised operational risks—such as waste generation, maintenance disturbances, and theft or vandalism of infrastructure—will be effectively managed. Overall, the operational phase of the Gibeon Upgrade Project is expected to result in a net positive outcome, as the long-term benefits of improved water security, socio-economic resilience, and reduced maintenance disruptions significantly outweigh these limited and manageable risks.

7.6 DECOMMISSIONING PHASE

7.6.1 Decommissioning of the newly constructed pipeline

The decommissioning of the proposed new pipeline is not foreseen during the validity of the Environmental Clearance Certificate (ECC), as it is designed for long-term operation. Should decommissioning occur at any stage in the future, a separate ESIA will be required and must be commissioned by the proponent.

7.6.2 Decommissioning of the existing

Once the new pipeline has been commissioned, the existing pipeline will remain in situ, and the switchover will be managed in a way that ensures no interruption of water supply.

It is important to note that only certain sections of the existing 53.3 km pipeline are made of asbestos cement (AC) pipes, while other sections are constructed of uPVC.

Typical methods of pipeline decommissioning include:

- Dismantling – physical removal of pipeline components;
- Local decommissioning – involving pigging, segmenting, plugging, and filling of the pipeline; and
- Abandonment in place – leaving the pipeline underground.

For this project, the preferred approach is to leave the existing pipeline in the ground, as this minimises disturbance to the surrounding environment, avoids unnecessary excavation impacts, and is more cost-effective for the proponent. Should sections of AC pipe require removal, this must be undertaken by an approved Inspection Authority for Asbestos Contractor in accordance with the Ministry of Labour and Employment Relations requirements and the ESMP.

7.6.3 Decommissioning Phase Impact Assessment

Provisions for decommissioning are included here for completeness, should it become necessary at any stage in the future. The existing 53 km pipeline comprises a mix of **asbestos cement (AC) and uPVC sections**:

- 20 km of Class 18 AC (first section),
- 20 km of Class 9 uPVC (middle section), and
- 13 km of Class 12 AC (last section).

The **uPVC sections** do not pose significant hazardous waste risks and can be removed, recycled, or abandoned in situ with standard handling and disposal procedures.

The **AC sections**, however, are classified as hazardous material due to their asbestos content. These pipes are over 40 years old and have become friable, increasing the risk of fibre release. If removal of these sections is required, strict controls will be necessary, including:

- Engagement of an **approved Inspection Authority for Asbestos Contractor**, authorised by the Ministry of Labour and Employment Relations;
- Compliance with the detailed asbestos handling procedures outlined in the ESMP.
- Provision of appropriate PPE for all workers (respirators, gloves, protective clothing);
- Restriction of public access through fencing and signage; and
- Safe transport and disposal of AC waste at **approved hazardous waste facilities** in Windhoek.

Potential impacts associated with AC pipe removal include generation of hazardous substances, worker and community safety risks, and visual/aesthetic concerns if infrastructure is left dilapidated. These impacts are **short-term and localised** and can be effectively mitigated with proper handling and disposal measures.

The potential impacts and mitigation measures are summarised in Table 38 and Table 39

Table 38: Decommissioning of uPVC Sections (20 km, Class 9)

Criteria	Assessment
Risk Event	Removal or abandonment of uPVC sections of the pipeline.
Nature of Impact	Negative (minor, non-hazardous); temporary and reversible.
Status of Impact	Negative.
Magnitude and Scale	Site-specific; minor disturbance to soil and vegetation.
Sphere of Influence / Impact	Minor – limited to pipeline corridor.
Duration	Short-term (decommissioning period only).
Probability of Occurrence	Probable.
Significance (no mitigation)	Low.
Confidence Limits	High.
Recommended Mitigation	• Standard removal, recycling, or abandonment in situ. • Dispose of rubble and construction waste at nearest approved dumpsite. • Restore affected areas through backfilling and vegetation re-establishment.
Residual Impact (after mitigation)	None–Low.
Comparative Evaluation of Alternatives	Both removal and abandonment in situ are low risk.
Cumulative Impacts	Negligible.
Related to Stakeholder Concerns	No.

Table 39: Decommissioning of AC Sections (33 km total: 20 km Class 18 + 13 km Class 12)

Criteria	Assessment
Risk Event	Removal or abandonment of asbestos cement (AC) sections of the pipeline.
Nature of Impact	Negative (hazardous waste risks); temporary but requires strict controls.
Status of Impact	Negative.
Magnitude and Scale	Site-specific to sub-local; risk of asbestos fibre release if not handled properly.
Sphere of Influence / Impact	Moderate – potential worker and community health risks if mishandled.
Duration	Short-term (decommissioning period only).
Probability of Occurrence	Probable–Highly probable without proper controls.
Significance (no mitigation)	High.
Confidence Limits	High – based on established asbestos hazards.
Recommended Mitigation	• Engage an **approved Inspection Authority for Asbestos Contractor**, authorised by the Ministry of Labour and Employment Relations. • Follow asbestos handling procedures in the ESMP. • Provide full PPE (respirators, gloves, protective clothing). • Fence off work areas and restrict public access. • Dispose of AC waste at **approved hazardous waste sites** (Windhoek).
Residual Impact (after mitigation)	Low – if strict asbestos protocols are followed.
Comparative Evaluation of Alternatives	Abandonment in situ is preferred; removal only if technically necessary.
Cumulative Impacts	Negligible if ESMP procedures are enforced.
Related to Stakeholder Concerns	No – not raised directly, but asbestos hazards are recognised regulatory concerns.

With the recommended mitigation measures in place, waste impacts from the decommissioning of both uPVC and AC sections will be effectively managed, ensuring residual impacts remain low and acceptable.

7.7 CUMULATIVE IMPACTS

Taken together, the project's cumulative impacts are not expected to be significant. The construction-phase effects are temporary and manageable, the operational phase provides strong positive socio-economic benefits, and decommissioning impacts can be effectively mitigated. Constructing the pipeline within the existing servitude further reduces cumulative impacts, as it avoids the need for new servitude acquisition, limits land-use change, and minimises disturbance to surrounding areas. The overall balance is positive, with the project enhancing long-term water supply reliability and socio-economic stability in the Gibeon Constituency and surrounding areas.

8 CONCLUSION AND ENVIRONMENTAL IMPACT RECOMMENDATIONS

This chapter of the report presents the assessment conclusion following the scoping phase, as well as the key recommendations and the environmental statement for consideration by the authorities. The conclusion and recommendations as presented in this chapter have been drawn from the assessment outcome, as presented in Chapter 7.

8.1 CONCLUSION

The reliable supply of safe drinking water to Gibeon settlement and the wider constituency has been identified as a critical enabler for socio-economic development in the Hardap Region. The existing bulk pipeline, which conveys water from boreholes over a distance of 53.3 km, has deteriorated with frequent pipe bursts and leakages, resulting in service disruptions and water losses. It is therefore proposed to replace the existing ageing pipeline with a new pipeline, designed to meet future water demand up to FY2038.

The environmental assessment was conducted in accordance with the Environmental Management Act (Act No. 7 of 2007) and the EIA Regulations (GN No. 30 of 2012), with the purpose of obtaining an Environmental Clearance Certificate (ECC) from the Environmental Commissioner. As part of this process, a comprehensive programme of stakeholder engagement and public consultation was undertaken, including meetings with the Gibeon Village Council, regional authorities, affected farmers (both commercial and resettled), and other stakeholders. The process provided valuable input that shaped the assessment findings and informed the recommended mitigation measures.

Given the nature of the proposed project and the sensitivity of the receiving environment, it is inevitable that certain biophysical and social impacts will occur. These include soil disturbance, temporary impacts on flora and fauna, noise and dust during construction, risks associated with hazardous materials in asbestos cement (AC) sections of the old pipeline, and social risks linked to the presence of external construction workers. However, the assessment demonstrates that all potential impacts can be mitigated to acceptable levels through strict adherence to the Environmental and Social Management Plan (ESMP).

Stakeholders consulted expressed strong support for the project, emphasising the importance of water supply reliability for both household use and farming livelihoods. Resettled communities in particular highlighted their dependence on the bulk supply and the need for uninterrupted access. The project is therefore widely accepted as essential to secure water supply for current and future needs.

8.2 RECOMMENDATIONS

- The existing asbestos cement sections of the old pipeline should preferably be left in situ to avoid unnecessary disturbance and asbestos exposure. Should removal be necessary, it must be undertaken by an approved Inspection Authority for Asbestos Contractor in line with the ESMP and Ministry of Labour and Employment Relations requirements.
- A switchover from the old to the new pipeline should be carefully managed to avoid any interruption in water supply to households, farms, and institutions.

- All mitigation and monitoring measures contained in the ESMP must be strictly implemented during the construction, operational, and decommissioning phases.
- NamWater should ensure that local stakeholders are informed and engaged throughout implementation, and that employment opportunities are prioritised for local people where possible.
- All required permits, licences, and approvals from competent authorities must be obtained before commencement of works.
- Monitoring of ESMP compliance should be carried out regularly, with proof of monitoring submitted to the Office of the Environmental Commissioner in line with ECC renewal requirements.

8.2.1 Recommendation to DWA and DEA

It is recommended that the proposed Construction of the Replacement Pipeline for the Gibeon Water Supply Scheme be granted an ECC, subject to the following conditions:

- Approval of the findings of this ESIA and associated mitigation measures.
- Full implementation of the Environmental and Social Management Plan (ESMP).
- Adherence to all statutory requirements under the Environmental Management Act (Act No. 7 of 2007) and its Regulations.
- Application of additional conditions deemed necessary by the Environmental Commissioner to ensure environmental compliance.

Lana Consultancy, the independent Environmental Assessment Practitioner, is of the opinion that this ESIA has sufficiently assessed the proposed project and that, with the recommended mitigation measures in place, the environmental and social impacts will remain within acceptable limits. The project is therefore considered environmentally feasible and should proceed, subject to compliance with the ESMP.

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10 APPENDICES

10.1 APPENDIX A - CV OF THE EAP

- Nangula Amutenya Amatsi (LEAD EAP)

10.2 APPENDIX B 1 - PROOF OF CONSULTATION PROCESS - FIRST ROUND

- Copies of newspaper advertisements (x4) announcing the project and consultation meetings.
- Stakeholder database compiled for the project.
- Minutes and attendance register for the consultation meeting with the Gibeon Village Council.
- Free, Prior, and Informed Consent (FPIC) forms signed by chairpersons of farms along the pipeline route.
- Minutes and attendance register for the public consultation meeting held with the Gibeon community.
- Free, Prior, and Informed Consent (FPIC) from the Gibeon Village Council.
- The Background Information Document (BID) distributed to stakeholders.

10.3 APPENDIX B 2 - PROOF OF CONSULTATION PROCESS - SECOND ROUND

- A notification email informing all pre-identified and registered I&APs of the availability of the Draft Scoping Report and request for comment.

10.4 APPENDIX C- ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

APPENDIX C

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR THE CONSTRUCTION OF THE REPLACEMENT PIPELINE FOR THE GIBEON WATER SUPPLY SCHEME

A PROJECT BY NAMWATER

ESMP- For submission to authorities

February 2026

Prepared by:

LANA ENVIRONMENTAL
ADVANCING DEVELOPMENT SUCCESS

Prepared for:

NAMWATER
Namibia Water Corporation Ltd

DOCUMENT STATUS

REPORT TYPE	Environmental and Social Management Plan – For submission to authorities
PROJECT TITLE	Environmental and Social Impact Assessment for the Construction of the Replacement Pipeline for the Gibeon Water Supply Scheme
PROJECT LOCATION	Gibeon, Hardap Region
PROJECT REFERENCE	Gibeon Upgrade Project
PROCUREMENT REFERENCE NUMBER	SC/RP/NW – 001/2026
ECC APPLICATION NUMBER	APP – 251106006619
COMPETENT AUTHORITY	Department of Environmental Affairs (Ministry of Environment, Forestry and Tourism) Department of Water Affairs (Ministry of Agriculture, Fisheries, Water and Land Reform)
PROPONENT & EXECUTING AGENT	Namibia Water Corporation Private Bag 13389 176 Iscor Street Windhoek Department of Applied and Scientific Services
ENVIRONMENTAL ASSESSMENT PRACTITIONER	Lana Consultancy and Trading cc P. O. Box 4628. Walvis Bay. Namibia Telephone: +264-81-2024059 E-mail: nangula.a@gmail.com Nangula Amutenya

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List of abbreviations & Acronyms

DEA:	Directorate of Environmental Affairs
DCI:	Ductile Cast Iron
DWA:	Department of Water Affairs
EAP:	Environmental Assessment Practitioner
ECC:	Environmental Clearance Certificate
ESIA:	Environmental and Social Impact Assessments
EMA:	Environmental Management Act No. 7 of 2007
ESMP:	Environmental and Social Management Plan
GN:	Government Notice
HDPE:	High-Density Polyethylene
I&APs:	Interested and Affected Parties
MAWLR:	Ministry of Agriculture, Water, and Land Reform
MEFT:	Ministry of Environment, Forestry, and Tourism
M-PVC:	Modified Polyvinyl Chloride
MSDS:	Material Safety Data Sheet
NHC:	National Heritage Council
PPE:	Personal Protective Equipment
NamWater:	Namibia Water Corporation Ltd
ToR:	Terms of Reference
SCADA:	Supervisory Control and Data Acquisition
uPVC:	Unplasticised Polyvinyl Chloride
VSD:	*Variable Speed Drive*
HDPE:	High-Density Polyethylene

Glossary of Terms

Chainage - chainage indicates the centerline of a linear structure, such as a road or pipeline. It's used in conjunction with “elevation” and “offset” to draw up construction plans.

Construction Phase - the project stage involving site establishment, trenching, pipe laying, testing, and rehabilitation.

Decommissioning Phase - the planned process of dismantling or abandoning infrastructure at the end of its useful life, including rehabilitation.

Environmental and Social Management Plan (ESMP) - a document outlining mitigation, monitoring, and management measures to address environmental and social impacts during a project’s lifecycle.

Environmental Assessment Practitioner (EAP) - a qualified professional responsible for conducting the ESIA and preparing the ESMP.

Environmental Clearance Certificate - environmental clearance certificate - This is a certificate which allows a listed activity to go ahead. The certificate means that the Ministry of Environment, Forestry and Tourism is satisfied that the activity in question will not have an unduly negative impact on the environment. It may set conditions for the activity to prevent or to minimise harmful impacts on the environment.

Environment - Environment the complex of natural and anthropogenic factors and elements that are mutually interrelated and affect the ecological equilibrium and the quality of life, including–

(a) the natural environment that is the land, water and air, all organic and inorganic material and all living organisms; and

(b) the human environment that is the landscape and natural, cultural, historical, aesthetic, economic and social heritage and values;

Environmental Control Officer (ECO) - a site-based officer responsible for monitoring compliance with the ESMP during construction.

Environmental and Social Impact Assessment (ESIA) - a systematic process to identify, predict, and evaluate potential environmental and social impacts of a proposed project.

Grievance Mechanism - a formal process for receiving, recording, and resolving complaints from workers or affected communities.

Hazardous Substance - hazardous substance: a hazardous substance is any substance that poses a threat to human health and the environment. Hazardous substances are toxic, corrosive, ignitable, explosive or chemically reactive.

Interested and Affected Parties (I&APs) - individuals, groups, or organisations affected by or having an interest in the project.

Mitigation Measures - actions implemented to avoid, minimise, remedy, or compensate for adverse environmental or social impacts.

Operation and Maintenance Phase - the stage during which the completed pipeline is operated, monitored, and maintained.

Pollution - this is the direct or indirect introduction of something which is harmful to people, property or the environment into the air, land or water. Pollution can be caused by substances, vibrations, heat, radiation or noise.

Proponent - this is the person who proposes to undertake a listed activity, in this project, NamWater.

Servitude - a legally registered right that allows infrastructure such as pipelines to be constructed and maintained across land.

Significant Effect - a “significant effect” means that something will have, or is likely to have, a qualitative or quantitative impact on the environment. A project would have a significant effect on the environment if it caused changes in ecological, aesthetic, cultural, historic, economic or social factors. This would be true regardless of whether the changes occurred directly or indirectly, or whether they took place individually or collectively (as a combined effect of several factors in the long-term).

Stakeholders - all parties affected by and/or able to influence a project, often those in a position of authority and/or representing others.

1 INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

The Gibeon Water Supply Scheme, located in the Hardap Region, supplies potable water to the settlement of Gibeon and surrounding farms through a 53.3 km bulk pipeline. The scheme sources water from two production boreholes at Farm Orab and delivers water by gravity into the settlement's terminal reservoir. The current infrastructure, comprising asbestos cement (AC) and uPVC pipeline sections, has become unreliable due to ageing and frequent bursts.

Figure 1 illustrates the geographic location of the Orab–Gibeon Water Supply Scheme and the schematic layout of the bulk water transmission pipeline.

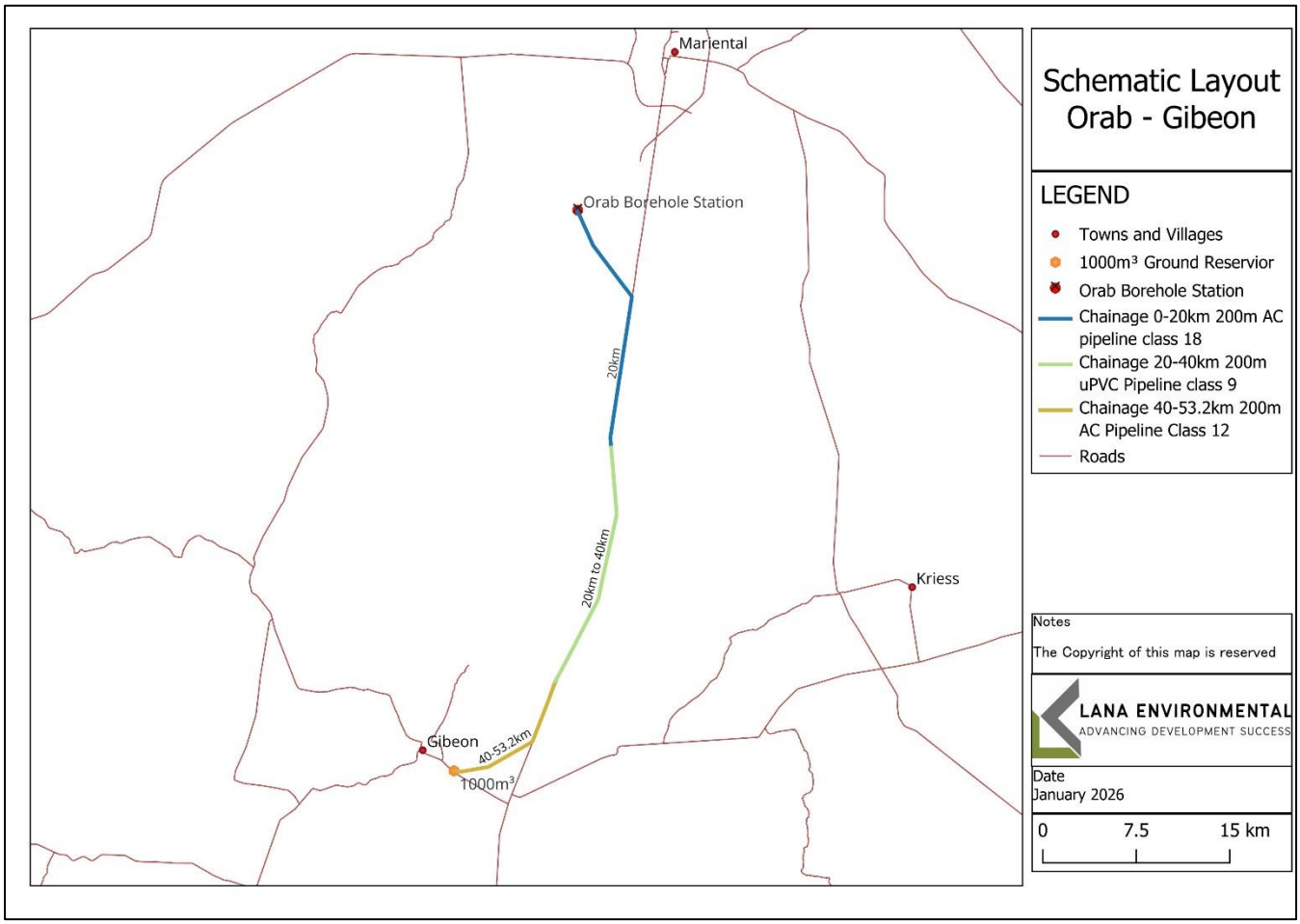


Figure 1: The locality of the Orab–Gibeon Water Supply Scheme and the layout of the existing bulk pipeline

1.2 DESCRIPTION OF THE EXISTIGN GIBEON WATER SUPPLY SCHEME

1.2.1 Boreholes

Water for the scheme is supplied by two production boreholes (WW27524 and WW27845) at Farm Orab, about 50 km north of Gibeon, each with a yield of 80 m³/hr. The boreholes are

electrically powered via a NamPower supply, with flows monitored and controlled through a telemetry system. Figure 3 shows the existing infrastructure at Farm Orab.

1.2.2 Pipelines

Water from the boreholes is conveyed via a 53 km bulk pipeline (200 mm diameter) comprising 20 km of Class 18 asbestos cement (AC), 20 km of Class 9 uPVC, and 13 km of Class 12 AC.

1.2.3 Reservoir and Associated Infrastructure

Raw water is pumped to the terminal reservoir at the NamWater premises in Gibeon. The facilities include a bulk water meter chamber regulating inflows to the settlement, secondary meter installations protected against vandalism, and a 1,000 m³ reinforced concrete ground-level reservoir equipped with standard inlet, outlet, scour and overflow pipework and safety features (Figure 4 and 4).

1.2.4 Water Quality and Disinfection

Water quality is maintained through gas chlorination at the ground-level reservoir, ensuring compliance with national drinking water standards. Groundwater from the Orab–Gibeon boreholes is of generally acceptable quality and requires only limited treatment. Disinfection is carried out using a secure, well-ventilated chlorination system in accordance with the Water Resources Management Act, 2013 and the Water Resources Management Regulations, 2023, ensuring the continuous supply of safe potable water to the Gibeon settlement.

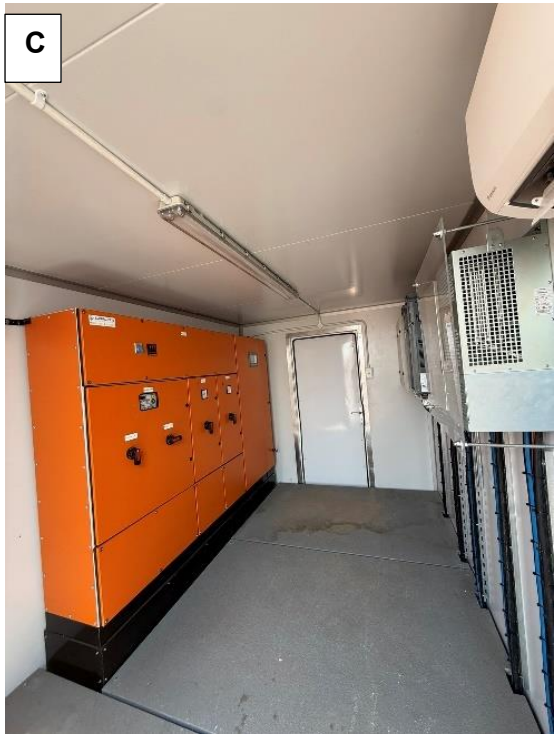


Figure 2: Existing infrastructure at Farm Orab forming part of the Orab–Gibeon Water Supply Scheme:

A - Operator's house
B - Borehole pump house
C - SCADA control panel
D - Electricity supply powerline.

Figure 3: A - Bulk water meter for the Gibeon Reservior B - 1,000 m³ reinforced concrete reservoir with adjacent Chlorine cylinder room

Figure 4: Secondary meter from reservoir to Gibeon Village Council (protected cage)

2 PROPOSED SCOPE OF WORKS

2.1.1 Project Location

The project area encompasses all affected sections along the existing and proposed pipeline route alignments within the designated servitude between Orab and Gibeon.

Both the existing and proposed alignments traverse the south-central part of the Hardap Region. The proposed new pipeline will be laid parallel to the existing one, within the same servitude corridor, to minimize additional land disturbance.

The project area includes land under the Gibeon Village Council, as well as communal and commercial properties situated along the existing and proposed pipeline route between Farm Orab and Gibeon.

2.2 PROPOSED SCOPE OF WORKS (SCHEME UPGRADE)

The Gibeon Upgrade Project will be completed in phases, starting with the most critical sections due to the expected high capital cost. The project was divided into two phases as follows:

Phase 1: System Upgrade & Automation

- **Control System Replacement:** The existing control system will be replaced with an automated telemetry system, linked between the terminal reservoir and the boreholes, and integrated with the NamWater SCADA system.
- **Variable Speed Drives (VSDs):** At least one, and potentially both, submersible motors will be equipped with a Variable Speed Drive (VSD). This will enable continuous low-flow operation, thereby preventing air from entering the pipeline during periods of low demand.
- **Flow Measurement:** Flowmeters will be installed at the boreholes, as well as inflow and outflow meters at the terminal reservoir. These will be connected to the upgraded telemetry system, improving the ability to detect pipeline breaks and leakages in real time, while also facilitating accurate water balance calculations for the 53.3 km pipeline.

Phase 2: Pipeline Replacement

- Full replacement of the existing 53.3 km pipeline is proposed.

2.2.1 Pipeline Route (BH 29114 To BH 29115 To Collector Reservoir)

The proposed pipeline route traverse's farmland, where human activity along the existing service road is limited. The alignment of the new pipeline will largely follow the route of the existing line but will be positioned approximately 3–5 metres away.

This approach will enable NamWater to continue utilising the existing service farm track and servitude during both the installation and the long-term maintenance of the new pipeline. Importantly, the pipeline will be placed within the servitude already registered over the project area, which is legally recognised and enforceable. Figure 5 provides a Google Earth image

highlighting the pipeline route and the corresponding chainages, while Figure 6 shows a scenic view along the pipeline route.

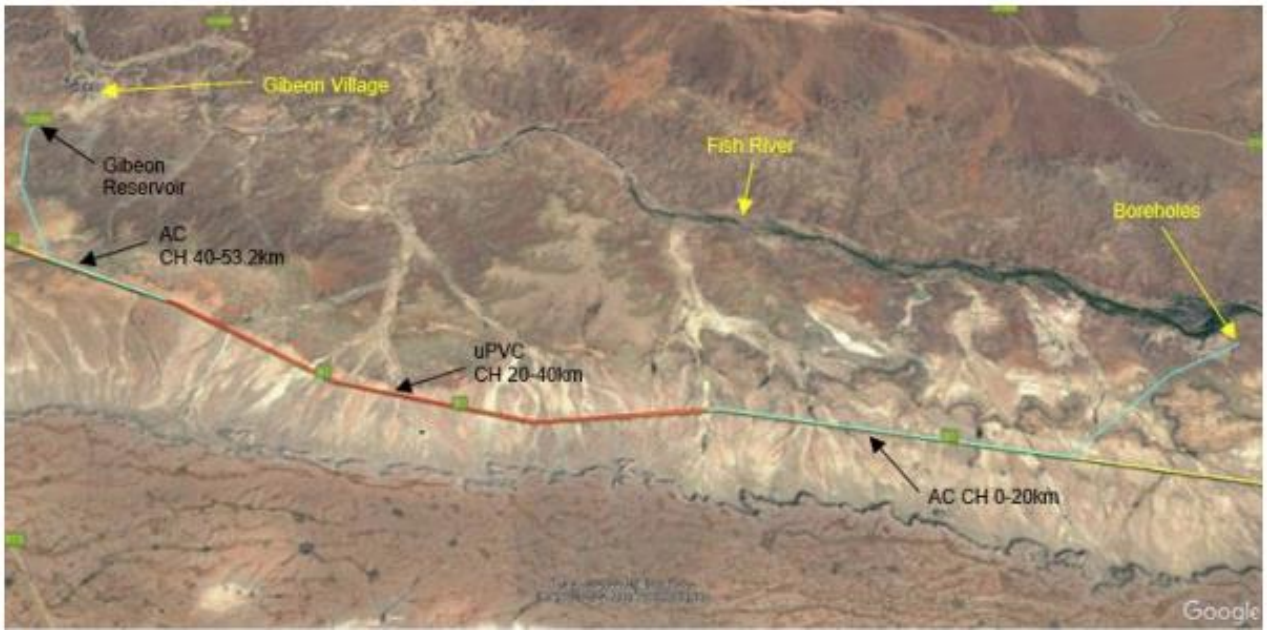


Figure 5: Pipeline Route (NamWater, 2023)

Figure 6: Scenic view along the route

2.2.2 Buried Pipeline

The entire existing pipeline from the boreholes to the Gibeon Reservoir is located below ground and will be left in situ. This approach will prevent disturbance to the current water supply during construction and minimise environmental impacts.

Inspections undertaken by the NamWater Engineering Team in 2023 and subsequently by the EAP in September 2025 confirmed that soil conditions along the pipeline route consist mainly of soft to intermediate material. On this basis, the new 53.3 km replacement pipeline will also be installed below ground, running parallel to the existing line.

2.3 PROJECT DESIGN

Based on the confirmed future water demand, the proponent will replace the existing bulk-potable pipeline serving Gibeon with a new M-PVC pipeline constructed along the existing route. The upgrade will provide a design flow of 50 m³/hr, sufficient to meet both current and projected future supply requirements. The existing pipeline will remain in operation during construction. Pipeline design specifications are presented in Table 1.

Table 1: Pipeline design specifications

Chainage	Pipeline Length	Pipe Diameter	Pipe Material	Pressure Class
0 km – 20 km	20 km	DN200	M-PVC	Class 12
20 km – 40 km	20 km	DN200	M-PVC	Class 12
40 km – 53.2 km	13.2 km	DN160	M-PVC	Class 9

The upgraded pipeline will run from the Gibeon borehole field toward the main reservoir over a total distance of 53.3 km. The project includes the replacement of the existing underground pipeline, associated fittings, and hydraulic control components.

2.4 PROJECT IMPLEMENTATION PHASES

The life cycle of the project constitutes different phases, and the ESMP's contents have been arranged accordingly, i.e.:

- Planning and Design Phase.
- Site establishment Phase.
- Construction Phase.
- Operation and Maintenance Phase.
- Decommissioning Phase.

This ESMP makes provision for the decommissioning phase at a preliminary level. More detailed decommissioning phase mitigation measures should be revised with each 3-yearly renewal of the ECC for this project.

2.5 NEED AND DESIRABILITY OF THE PROJECT

The Civil Preliminary Design Report for the Gibeon Upgrade Project (2023), prepared by the NamWater Civil Engineering Team, identified a number of technical challenges within the existing water supply infrastructure. These highlight the necessity of the proposed upgrade:

Adequate Borehole Capacity

- The two existing production boreholes, BH27524 and BH27845, each yield approximately 80 m³/hr. This combined yield is sufficient to meet current and future demand, confirming that water availability from the source is not a limiting factor for the scheme.

Pipeline Performance

- Between May 2021 and May 2023, records indicate 146 incidents of pipe bursts and leakages along the main pipeline. Such failures have disrupted water supply and increased maintenance requirements, pointing to the need for a more reliable system.

Air Valve Functionality

- Several off-takes have been connected to existing air valves. This practice may have limited the effectiveness of the valves, reducing their ability to maintain hydraulic efficiency and potentially contributing to pressure-related failures.

Condition of Asbestos Cement (AC) Pipeline Sections

- The AC pipeline sections covering Chainage 0–20 km and 40–53.3 km show significant deterioration due to age. These sections are no longer structurally reliable and require replacement.

Condition of uPVC Pipeline Sections

- The uPVC section between Chainage 20–40 km has experienced repeated bursts and leakages. The frequency of these incidents indicates that full replacement is the most viable solution.

The ageing pipeline has reduced the scheme's reliability and efficiency. The Gibeon Upgrade Project will replace key pipeline sections and restore hydraulic controls, ensuring a dependable, sustainable, and safe water supply for households, schools, hostels, businesses, public institutions, and farmers in and around Gibeon.

This document contains the Environmental and Social Management Plan (ESMP) for the planning, construction, operation and decommissioning and closure of the construction of the replacement pipeline for the Gibeon Water Supply Scheme.

3 ENVIRONMENTAL AND SOCIALMANAGEMENT PLAN

3.1 WHAT IS AN ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN?

ESMPs are important tools that focus on the management actions that are required to ensure the environmental and social compliance of a project. The Environmental Impact Assessment Regulations (2012) of the Environmental Management Act No. 7 of 2007 state that "*management plan means a plan that describes how activities that may have significant effects on the environment are to be mitigated, controlled and monitored".*

It further indicates that a draft management plan should include:

- "Information on any proposed management, mitigation, protection or remedial measures to be undertaken to address the effects on the environment that have been identified, including objectives in respect of the rehabilitation of the environment and closure.
- as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of the activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and
- a description of the way the applicant intends to modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation, remedy the cause of pollution or degradation and migration of pollutants."

3.2 OBJECTIVES OF THE ESMP

This ESMP has been compiled for the management of potential environmental impacts during the planning, design, operation, and decommissioning phases of the proposed construction of the replacement pipeline for the Gibeon Water Supply Scheme. The ESMP also includes best practices for the generic issues of construction management and supervision as well as the ongoing management and operation of the scheme.

The specific objectives of this ESMP are:

- Present measures to avoid, lessen and mitigate adverse impacts on various environmental components, and enhance the value of environmental components where possible.
- Defining the roles and responsibilities for the implementation of environmental management and mitigation measures.
- Explain the need for compliance with regulatory provisions and guidelines.
- Explain procedures for compliance monitoring and reporting to the relevant competent and regulatory authorities.
- Present procedures for the possible decommissioning and required environmental rehabilitations.

ESMP implementation is a repeated process that converts mitigation measures into actions. This is achieved through continuous monitoring, auditing, review and corrective action to ensure conformance with the aims and objectives of this ESMP. An ESMP should be flexible and respond to unforeseen events and changes in project implementation that were not considered before. To ensure that the ESMP remain effective, through monitoring and auditing, feedback for continual improvement in environmental performance must be provided, and corrective actions must be taken.

3.3 LEGAL IMPLICATIONS AND OBLIGATIONS UNDER THIS ESMP

The proposed project is a listed activity under the EIA Regulations: Environmental Management Act of 2007 (Act No. 07 of 2007), which may not be undertaken without an environmental clearance certificate (ECC), and is listed as follows:

Infrastructure - No.10.1. The construction of (a) oil, water, gas and petrochemical, and other bulk supply pipelines. As such, an application for an ECC can only be made once an EIA study has been undertaken and approved by the Competent Authority (Department of Water Affairs (DWA)) and the Regulatory Authority (Ministry of Environment, Forestry, and Tourism (MEFT)).

This ESMP was prepared in line with Section 8 (j) of the EIA Regulations (GN 30 of February 2012), and the proponent's Terms of Reference.

The ESMP will be sent to the MEFT Department of Environmental Affairs (DEA) for approval. Once the DEA is satisfied with the contents of the ESMP, it will issue an ECC to the Proponent. The ECC is linked to the recommendations of the ESMP.

The SEMP, once accepted, therefore becomes a legally binding document, and each role-playerincluding contractors and sub-contractors who are made responsible for implementing the relevant sections of this ESMP is required to abide by the conditions stipulated in this ESMP document.

4 GENERAL REQUIREMENTS OF THE ESMP

The implementation of the ESMP requires various role players, each with specific responsibilities, to ensure that the proposed infrastructure is planned and designed, constructed, operated, and maintained in an environmentally sound manner.

4.1 ADMINISTRATION OF ESMP

Copies of this ESMP should be kept at the site office and need to be distributed to all senior contract personnel. All senior personnel are required to familiarize themselves with the contents of this document.

4.2 ROLES AND THEIR RESPONSIBILITIES

4.2.1 Project Involvement

NO.	Specific Project Role	Address and Contacts
1.	Proponent	NamWater Ltd. Project Manager: Mr Nangolo Ashipala Email: AshipalaN@namwater.com.na Environmental Services Sub-Division: Mrs. Jolanda Kamburona Tel: +264 (61) 71-2105 Email: KamburonaJ@namwater.com.na Mr. Fillemon Aupokolo Tel: +264 (61) 71-2095 Email: AupokoloF@namwater.com.na
2.	Environmental Assessment Practitioner	Lana Consultancy and Trading CC Ms. Nangula Amutenya Mobile: +264812024059 Email: nangula.a@gmail.com
3.	Permitting Authority	Ministry of Environment Forestry and Tourism Directorate of Environmental Affairs Chief Conservation Scientist Mr. Damian Nnchido Mobile: +264 61 284 2701 Email: Damian.Nchido@meft.gov.na

4.3 PROPONENT (NAMWATER)

The proponent will play an important role to ensure the successful implementation of this ESMP. This can be achieved by designating a project Team that should take responsibility to ensure that the ESMP is adhered to during the planning & design, construction, and decommissioning phase. The proponent shall support the Contractor in the management and monitoring of possible adverse environmental, social and climate impacts and risks associated with the implementation of the construction, operation, maintenance and decommissioning of the replacement pipeline for the Gibeon Water Supply Scheme.

NamWater, as the implementing agency, the following officials will be responsible for:

4.3.1 Environmental Project Team

NamWater (the Proponent) will be responsible for the establishment of an Environmental Project Team which will comprise of NamWater officials, such as the Engineer, the Resident Engineer and an Environmentalist or any other nominee in the event of one of the members not being able to attend.

The core function of this Forum will be to –

- Provide feedback to stakeholders regarding the Project and implementation of the ESMP;
- Highlight stakeholder concerns regarding implementation and address stakeholder concerns; and
- Handle any disputes or disagreements between role players on Site (concerning environmental management).

Regular meetings will be held by the Environmental Forum, the purposes of the meetings shall be:

- To establish the suitability of the Contractors' methods and machinery to lower the risk involved for the environment.
- To discuss possible non-conformance to ESMP guidelines or environmental legislation.
- To discuss the general state of the environment on site and discuss any environmental problems which may have materialized.

4.3.2 Manager: Environmental Services Sub-division

In collaboration with the RE and the Project Team, the Environmentalists will:

a) Oversee compliance with the ESMP
b) Be present at the project site inspections and meetings
c) To ensure and support occupational health and safety as well as health protection in the workplace.
d) Receive and attend to complains as received from the Resident Engineer and the Environmental Control Officer (ECO).
e) Resolve complaints/grievances which have been escalated to their attention

f) Notify the DWA and MEFT of any proposed changes to the scope of the project and potential environmental impacts.
g) Keep a record of emergencies and take corrective actions as per Section 10.
h) To promote and provide means for effective and inclusive engagement with project-affected parties throughout the project life cycle on issues that could potentially affect them.
i) To ensure that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner and format.

4.3.3 Environmentalist

The Environmentalist must be an appropriately qualified person in environmental management and must possess the skills necessary to impart environmental management skills to all personnel involved in the contract. The Proponent needs to appoint the Environmentalist who will act as the onsite implementing agent and has the responsibility to ensure that the Proponent's responsibilitiesare executed in compliance with relevant legislation and the ESMP.

Any on-site decisions regarding environmental management are ultimately the responsibility of the Environmentalist. The on-site Environmentalist shall assist the RE and the ECO (where necessary) and will have the following responsibilities in terms of the implementation of this ESMP:

- The Environmentalist will be on-site at a predetermined frequency (at least once every third week) and will be responsible for ensuring the implementation of the ESMP throughout the construction period.
- Ensuring that the necessary environmental authorizations and permits have been obtained.
- Liaison with the Proponent, Engineer, Resident Engineer and Environmental Authorities. The Environmentalist will be responsible to the Proponent.
- The Environmentalist shall make recommendations independent of the Engineer; take immediate action on Site when (i) prescriptive conditions are violated or in danger of being violated, and inform the Engineer, Resident Engineer/s and Contractor/s immediately of the occurrence and to take action, e.g. issuing of fines; and (ii) where clearly defined and agreed 'no go' areas are violated or in danger of being violated, and to inform the Engineer, Resident Engineer/s and Contractor/s of the occurrence and action taken.
- Assisting the Contractor in finding environmentally responsible solutions to problems with input from the ECO where necessary.
- Ordering the removal of person(s) and/or equipment not complying with the ESMP specifications.
- The Environmentalist must oversee the mitigation measures and ensure compliance withthe conditions of approval and the ESMP.

- Issuing fines for transgressions of site rules and penalties for contravention ofthe ESMP.
- Providing input into the ECO's ongoing internal review of the ESMP, this review report is submitted to the Proponent.
- Conduct compliance monitoring as outlined in Section 9 of this ESMP.
- The Environmentalist along with the Engineer and RE, must obtain, examine and approve Method Statements.

4.3.4 Resident Engineer

The Resident Engineer (RE) is responsible for:

a) Ensuring that the objectives of the ESMP are met.
b) Ensuring that the Designing Engineer is aware of this ESMP and has applied the relevant proposed mitigation measures outlined in this ESMP.
c) Take disciplinary actions in cases of transgressions and non-compliance.
d) Ensuring that all environmental impacts are managed according to the environmental principles of avoiding, minimizing, mitigating, and rehabilitation as contained in this ESMP.
e) To ensure and support occupational health and safety as well as health protection in the workplace.
f) Ensuring that appropriate monitoring and compliance auditing are executed.
g) To anticipate and avoid adverse impacts on the health and safety of project-affected communities during the project life cycle from both routine and nonroutine circumstances.
h) Ensuring that the environment is rehabilitated to its natural state as far as possible.
i) Examine and approve Method Statements.
j) Appropriate compliance monitoring is executed as outlined in Section 9
k) Handle grievances/complaints in the prescribed manner as outlined in Section 11.9

4.3.5 Scheme Superintendent

As the overall responsible official for the operation of the Gibeon Water Supply Scheme, they shall oversee the implementation of this ESMP during the operation and maintenance phases. The Scheme Superintend shall ensure.

- That a copy of this ESMP is always kept in the office.
- That all employees involved in the operation and maintenance of the Gibeon Water Supply Scheme are aware of this ESMP and provide brief training (when necessary).
- To ensure and support occupational health and safety as well as health protection in the workplace.
- That all employees and contractors are aware to avoid all forms of discrimination of their employees.
- To protect scheme workers, including vulnerable workers such as women, persons with disabilities, children (of working age) and migrant workers, contracted workers, community workers and primary supply workers, as appropriate.

- To promote the fair treatment, non-discrimination and equal opportunity of project workers
- Are made aware to condemn forced labour and child labour, ban discrimination in respect of employment and occupation, and support the freedom of association and the right to collective bargaining under national laws.
- To have in place effective measures to address emergency events.
- Keep a record of emergencies and take corrective actions as per Section 10.
- All operation and maintenance activities are in line with NamWater's environmental code of conduct.
- To provide project workers with accessible means to raise workplace concerns.
- Handle grievances in the prescribed manner as outlined in Section 11.
- Take appropriate disciplinary action against the Gibeon Water Supply Scheme maintenance employees in case of a transgression.
- To avoid or minimize community exposure to project-related traffic and road safety risks, diseases and hazardous materials.
- To promote and provide means for effective and inclusive engagement with project-affected parties throughout the project life cycle on issues that could potentially affect them.
- To ensure that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner and format. +

4.4 CONTRACTOR AND SUB-CONTRACTORS

The Contractor (irrespective of whether internal or external) shall conduct his activities to cause the least possible disturbance to the existing amenities, whether natural or man-made, under 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 (in Consultation with NamWater) 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.

The Contractor is responsible / should:

- Acquire a basic understanding of the key environmental features on the site and its immediate environment.
- Become familiar with the environmental controls contained in the ESMP.
- To ensure and support occupational health and safety as well as health protection in the workplace.
- Are informed that natural features (e.g., rock formations) are not defaced or marked for survey or other purposes unless agreed beforehand with the engineer and natural water sources (e.g. streams) are not allowed to be used for swimming, personal washing, or the washing of machinery or clothes.
- To promote fair treatment, non-discrimination and equal opportunity of project workers
- To protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age) and primary supply workers, as appropriate.
- Avoid all forms of discrimination against their employees.

- Avoid negatively influencing existing conflict dynamics.
- Is aware of NamWater's Code of Conduct.
- Is aware of the need to conserve water and minimise waste.
- Receive and issue pertinent, written instructions regarding compliance with the relevant environmental management requirements (viz., typical environmental dos and "don'ts").
- Is made aware of any other environmental matters as deemed necessary by the Engineer / Environmentalist and ECO.
- Condemn forced labour and child labour, ban discrimination in respect of employment and occupation, and support the freedom of association and the right to collective bargaining under national laws.
- Are aware that a copy of the ESMP is readily available on-site and that all site staff are aware of the location and have access to the document.
- To provide project workers with accessible means to raise workplace concerns.
- Handle grievances in the prescribed manner as outlined in Section 7.4.
- To avoid or minimize community exposure to project-related traffic and road safety risks, diseases and hazardous materials.
- To ensure that the safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project-affected communities.
- To promote and provide means for effective and inclusive engagement with project-affected parties throughout the project life cycle on issues that could potentially affect them.
- Ensure that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible, and appropriate manner and format.
- Are made aware of the importance of preserving archaeological sites.
- Receive detailed training in site health and safety requirements, emergency responses and site evacuation procedures in terms of the Contractor's health and safety plan.
- Are made aware of NamWater's Code of Conduct.
- HIV/AIDS awareness training and the training should indicate where condoms are freely available on site.
- Awareness around birth control and the potential long-term risks associated with casual sex.
- Are made aware that prostitution shall not be tolerated in the construction camp.
- Workers shall be made aware that SEASH (Sexual Exploitation, Abuse and Sexual Harassment) will not be tolerated.

The Contractor/s, upon receiving this ESMP, should ensure compliance with this ESMP by:

- Ensure that a copy of this ESMP is always kept on site.
- Undertaking their activities in an environmentally sensitive manner and within the context of this ESMP.
- To have in place effective measures to address emergency events.
- Keeping a record of emergencies and taking corrective actions as per Section 10.
- Taking appropriate disciplinary actions against their employees in case of transgression.

4.4.1 Environmental Control Officer

A suitably qualified and experienced ECO shall be appointed by the Contractor before the commencement of construction to ensure that the mitigation and rehabilitation measures are implemented and to ensure compliance with the provisions of the ESMP.

The ECO is responsible for overseeing and monitoring compliance with and implementation of the ESMP. The ECO's responsibilities include:

- Liaison with the community, NamWater, Resident Engineer and Environmental Authorities.
- Liaise with stakeholders from neighbouring communities to ensure that the project does not adversely impact the living conditions of communities, in particular indigenous peoples and other vulnerable groups, as well as to ensure the rights, living conditions and values of indigenous peoples.
- Monitoring of all the Contractor's activities for compliance with the various environmental requirements contained in this ESMP.
- To promote fair treatment, non-discrimination and equal opportunity of project workers.
- Monitoring of all contractors' activities for compliance with occupational health and safety requirements as well as health protection in the workplace.
- Monitoring of all contractors' activities to avoid or minimize community exposure to project-related traffic and road safety risks, diseases and hazardous materials.
- Ensuring that the requisite remedial action is implemented in the event of non-compliance.
- Ensuring the proactive and effective implementation and management of environmental protection measures.
- Ensuring that a register of employee and public complaints is maintained by the Contractor and that all employee and public comments or issues are appropriately reported and addressed.
- Routine recording and reporting of social and environmental activities, incidents and non-compliance every month.
- To have in place effective measures to address emergency events. Keeping a record of emergencies and taking corrective actions as per Section 10.
- To promote and provide means for effective and inclusive engagement with project-affected parties throughout the project life cycle on issues that could potentially affect them.
- Ensure that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible, and appropriate manner and format.
- Notifying the Environmental Authorities immediately of any events or incidents that may cause significant environmental damage or breach the requirements of the ESMP.
- Presenting Environmental Awareness Training courses to the Contractor's entire team of workers before commencing with construction. All new appointees should also receive the training.
- The ECO shall be at the site with the construction team to ensure compliance.
- Bi-Monthly compliance reports shall be submitted to the Environmentalist, Resident Engineer and the Environmental Forum. The compliance report shall address all issues of non-compliance, remedial action recommended and implementation thereof. It is recommended that an Environmental Audit Report be carried out 6 months after

construction has been completed and submitted to the Environmental Authorities and NamWater.

4.4.2 Environmental and Social Awareness Training

It is important to ensure that Contractors, sub-contractors, and all Orab – Gibeon pipeline replacement employees have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and minimization of environmental harm.

To achieve this, all parties involved in any work at the Orab–Gibeon pipeline during the construction, operation, maintenance, and decommissioning phases should be briefed on their obligation towards environmental protection in terms of the ESMP before work commences. The training should also cover the actions outlined in the emergency response plan, NamWater's environmental code of conduct.

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

The initial Environmental Awareness Training Course shall be held within 14 days of the site mobilisation date, and subsequent courses shall be arranged for all new employees arriving after the initial training course.

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

Environment and health awareness training programmes should be targeted at three distinct levels of employment, i.e., the executive, middle management and labour. The Proponent shall ensure that adequate environmental training takes place. All employees should be given an induction presentation on environmental awareness and the content of the ESMP. The presentation shall be conducted, as far as possible, in the employees' language of choice.

As a minimum, training should include:

- Explanation of the importance of complying with the ESMP, including a basic explanation of the importance of environmental sustainability for the survival of mankind.
- Aware of the importance of preserving archaeological sites.
- Receive detailed training on on-site health and safety requirements, emergency responses and site evacuation procedures in terms of the Contractor's health and safety plan.
- HIV/AIDS awareness training and the training should indicate where condoms are freely available on site.
- Awareness of what constitutes SEASH behaviours.

- Awareness around birth control and the potential long-term risks associated with casual sex, and that any person who commits or attempts to commit a sexual act with a child under the age of 16 years shall be guilty of an offence.
    - Are aware of the requirements of any approved Method Statements that have to bear on their activities, and where necessary, any specialised training required to ensure compliance with the approved Method Statements has been provided.
    - 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.
    - Discussion of the potential environmental impacts of construction activities.
    - Employees’ roles and responsibilities, including emergency preparedness.
    - Explanation of the mitigation measures required to be implemented when carrying out their work activities.
    - Environmental legal requirements and obligations.
    - Details regarding floral/faunal species of special concern and protected species, and the procedures to be followed should these be encountered during the construction of the pipeline, access roads, approach roads or construction camp.
    - The importance of not littering.
    - The importance of using the supplied toilet facilities.
    - The need to use water sparingly.
    - Details of and encouragement to minimise the production of waste and re-use, recover and recycle waste where possible.
    - Details regarding archaeological and/or historical sites which may be unearthed during construction and the procedures to be followed should thesebe encountered.

The Contractor shall keep records of all environmental training sessions, including names, dates and the information presented.

4.5 PUBLIC PARTICIPATION

Public participation shall remain an ongoing process throughout the construction and operational phases of the project to ensure that stakeholders are meaningfully involved and kept informed. For this project, it will be sufficient to hold regular engagement meetings with the inhabitants of Gibeon Village and the eight farms located along the pipeline route, namely: Orab North, Orab South, Sonnerau, Jakkels Fountain, Vaaldam, Southput, Falkenhorf, and Hobby Garden, whenever applicable, to discuss project progress and any construction-related issues that may arise.

If a public matter or concern arises at any point, the Contractor shall immediately arrange a forum to address and resolve the issue with the relevant interested and affected parties (I&APs). These meetings shall be organised by the ECO and facilitated by the Environmentalist.

A complaints register shall be maintained on-site at all times to record issues raised by the public and document how each concern is addressed and resolved.

5 LEGAL AND POLICY FRAMEWORK

The ESMP implementation shall be guided by the legislative framework as outlined in the ESIA report and briefly presented below.

Table 2: Applicable legislation

Legislation	Project Implications
Deeds Registries Act 14 of 2015	Confirms that the existing servitude for the pipeline is legally recognised. New registration is only required if amendments are made to the servitude.
Flexible Land Tenure Act 4 of 2012	Supports recognition of water pipeline servitudes in settlement and urban areas.
Flexible Land Tenure Regulations (2018)	Provides procedures for registration or amendment of servitudes, should adjustments (e.g., widening or alignment changes) be necessary.
Communal Land Reform Act 5 of 2002 — Servitude Provisions	Ensures that servitudes crossing communal areas follow consultation and compensation requirements.
Constitution of the Republic of Namibia (1990)	Requires implementation of the ESMP to support sustainable resource use, ecosystem protection, biodiversity conservation, and fair labour standards.
Namibia Water Corporation Act 12 of 1997	Mandates NamWater to plan, design, construct, operate, maintain and decommission the Gibeon bulk water supply infrastructure.
Environmental Management Act 7 of 2007 & EIA Regulations (GN 30/2012)	The project requires an ECC. ESMP implementation, public participation and environmental assessment procedures are mandatory.
Water Resources Management Act 11 of 2013	All activities must prevent water pollution and protect groundwater resources. Existing water use authorisations must remain valid, and construction must comply with water protection provisions.
Forest Act 12 of 2001	Ensure the protection and preservation of indigenous and protected tree species in accordance with the provisions of the Act, and obtain the necessary permits where

Legislation	Project Implications
	removal or disturbance is unavoidable.
Water Resources Management Regulations, 2023 (GN 269/2023)	The existing chlorination process must comply with approved treatment standards. Only trained personnel may operate treatment systems, and potable water quality standards must be met.
Public Health and Environmental Act 1 of 2015	Dust, noise, waste and odours must be controlled. Adequate sanitary facilities must be provided according to the minimum legal requirements.
Communal Land Reform Act 5 of 2002	Where the servitude intersects communal land, rights must be respected, and impacts managed through consultation and compensation where required.
Traditional Authorities Act 25 of 2000	Traditional Authorities must be engaged where applicable to ensure alignment with local customs and community-level environmental responsibilities.
Labour Act 11 of 2007	All labour practices must comply with national labour standards. Contractors must provide safe working conditions and adequate PPE.
Regulations Relating to the Health and Safety of Employees at Work (GN 156/1997)	Occupational health and safety regulations, including hazardous substance and asbestos handling requirements, must be fully adhered to.
National Heritage Act 27 of 2004	Any heritage resources or human remains discovered must be reported to the National Heritage Council immediately. Work must stop in the affected area.
MEFT Policy on HIV/AIDS	Requires implementation of HIV/AIDS awareness and prevention measures, particularly for construction workers interacting with local communities.
Local Authorities Act 23 of 1992	The project must comply with the requirements and by-laws of the Gibeon Village Council and any relevant Local Authority.
Urban and Regional Planning Act 5 of 2018	All land use planning, servitude registration and town planning processes must comply with the Act.

Legislation	Project Implications
White Paper on National Water Policy for Namibia	The project must promote sustainable, equitable, and reliable water supply and protect the water resource base.
Labour Act 11 of 2007; Combating of Rape Act 8 of 2000; Child Care & Protection Act 3 of 2015; MEFT Policy on HIV/AIDS; National GBV Action Plan.	Prohibits sexual exploitation, abuse and harassment; requires strict enforcement of SEASH-prevention measures, worker training, confidential reporting systems, and zero-tolerance policies on site.

6 ENVIRONMENTAL AND SOCIAL MANAGEMENT REQUIREMENTS

The successful implementation of this ESMP will depend on various factors such as training and awareness, enforcement, good record keeping, and reporting.

6.1 CONSTRUCTION PHASE

As part of tender requirements, Contractor/s and Sub-contractors are obliged to educate their employees on the implementation of the ESMP and NamWater's environmental code of conduct. The Contractor/s and subcontractors should provide training to their employees on environmental issues related to construction. This training can be in the form of an on-site talk before the commencement of any work. Employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) should be placed at prominent locations throughout the site. Record of such training should be kept by the Contractor and should be handed to the Resident Engineer.

6.2 OPERATION AND MAINTENANCE PHASE

The Scheme Superintendent should ensure that Gibeon Water Supply Scheme maintenance staff receive appropriate training on the environmental issues pertaining to the operation and maintenance of the proposed new pipeline, and to carry out their works under this ESMP.

6.3 RECORD KEEPING

There should be an up-to-date filing system for the replacement pipeline for the Gibeon Water Supply Scheme, whereby method statements, environmental incident reports, training records, audit reports, and public complaints registers are kept. It is advised that photographs of the site should be taken as a visual reference. The grievance register must be kept by the RE during the construction phase and by the Scheme Superintendent during the operation phases, respectively.

6.4 ENFORCEMENT

This ESMP, upon approval by MEFT, shall be a legally binding document; thus, the commitment and cooperation of the identified responsible person(s) will ensure the effective implementation of the ESMP. Adherence to this ESMP will ensure that the environmental impacts associated with the project will be mitigated to a greater extent thus promoting sustainable development. The ESMP will be enforced in accordance with the provisions of Section of the Environmental Management Act 07 of 2007 through a contract between NamWater and the Contractor.

6.4.1 Method Statements

Method Statements are statements that come into effect when the original project design changes significantly enough to disturb areas that were not part of the ESIA study. In this case, the method statement will outline the number of deviations, description, maps, and new designs. Coupled with the environmentalists' input on the impact the deviation could have on the environment.

Method statements from the Contractor can also be required for specific sensitive actions on request of the authorities or Environmentalist. In this case, the method statement will form the baseline information on which sensitive area work takes place.

Should they be necessary, the following method statements will be necessary during the construction phase:

- Construction procedures.
- Materials and equipment to be used.
- How and where materials will be stored.
- The containment of accidental leaks or spills as prescribed by this ESMP (Section 10.2.4: Emergency Response Procedures).
- Timeline and location of activities; and
- Any other information deemed necessary by the Environmentalist /RE.

A method statement describes the scope of the intended work in a step-by-step description in order for the Environmentalist or Engineer to understand the Contractor's intentions. This will enable them to assist in devising any mitigation measures, which would minimise environmental impact during these tasks. The method statement should also clearly stipulate mitigation methods of the intended works, against which the contractor's performance will be measured. For each instance wherein it is requested that the Contractor submit a method statement to the satisfaction of the Environmentalist and Engineer, the format should clearly indicate the following:

- **What** - a concise description of the task/work to be undertaken.
- **How** - a detailed description of the process of work, methods, materials and mitigation strategies.
- **Where** - a description/sketch map of the locality of work (if applicable); and
- **When** - the sequencing of actions with due commencement dates and completion date estimates.

Therefore:

- The Contractor must submit the method statement two weeks before the commencement of any construction activity.
- Work may not commence until the method statement has been accepted by the RE and ECO and communicated to the workforce.
- The Contractor shall, except in the case of emergency activities, allow 14 days for consideration and approval of the method statement.
- The RE and Environmentalist may require changes to the method statement if the proposal does not comply with the specifications or if, the proposal may result in damage to the environment more than that permitted by the specifications.
- Approved method statements shall be communicated to all relevant personnel.

A generic example of a method statement is in Annexure A**.**

6.4.2 Lay-out plan for the lay – down areas

The layout/description of the laydown areas is required, especially during the construction phase, to describe and indicate how they will be set up and managed. This should be provided in a step-by-step description for the RE or ECO to understand the contractor's intentions. This will enable them to assist in devising any mitigation measures, which would minimize environmental impact during construction. These descriptions of the layout should also clearly stipulate mitigation methods of the intended works, against which the contractor's performance will be measured. In this case, the following method statements will be necessary during the construction phase.

6.4.3 Non-compliance and disciplinary actions

In cases of transgressions and non-compliance with the ESMP, the following actions may be taken against the transgressor.

- Disciplinary actions
- Legal actions
- Termination of contract

The Environmentalist collaboration with the designated ECO will ensure that the ESMP is fully complied with by the appointed Contractor and employees during the construction phase. The RE and ECO shall issue disciplinary actions based on the severity of the environmental damages and the nature and extent of the transgression / non-compliance. In addition, the Proponent may also institute legal actions against the transgressor in line with the Public Procurement Act 15 of 2015 and NamWater's contract agreement.

The Scheme Superintendent will ensure compliance during the operation and maintenance phase. Non-compliance or transgression shall result in disciplinary actions being taken against the transgressor. Transgressions should be recorded in a dedicated register and filed.

6.5 ENVIRONMENTAL AUDIT REPORTS

The ECO shall prepare monthly audit reports and submit them to the Environmentalist. The report should indicate the environmental performance, compliance to the ESMP, and matters of interest. The report should also identify:

- Environmental issues caused by construction.
- Issues that have been resolved.
- Issues that remain unresolved and how they plan to address them.

Furthermore, the Proponent shall ensure regular monitoring of project activities during all project phases and keep records. These records may be required by the competent authority when deemed necessary or for the renewal of the ECC if the project is not completed within three years. The records will be required when applying for renewal of the ECC, and NamWater will also have to indicate how the ESMP was adjusted to make provision for improved mitigation measures and action plans.

7 MANAGEMENT OF IDENTIFIED IMPACTS

This section outlines the proposed mitigation measures to avoid, prevent, mitigate and/or enhance the identified potential impacts associated with the proposed replacement pipeline for the Gibeon Water Supply Scheme. It also outlines the responsibilities of each party involved in the project implementation under each phase. The project activities are grouped according to the different operational processes and stages (planning & design, construction, operational, and decommissioning phases).

7.1 PLANNING AND DESIGN PHASE

The first step in avoiding and preventing any possible negative impacts during the construction, operation, maintenance, and decommissioning phase should start with the planning and designing phase. The planning and design phase includes the drafting of the pipeline design plan, surveying activities and pipeline route selections before construction commences.

This ESMP aims to ensure best practices are implemented and environmental degradation is avoided through appropriate environmental protection and adherence to legal requirements. The ESMP also ensures that the best alternative options are selected and implemented as recommended in the Scoping report.

7.1.1 Land Use Requirements

The recommended actions are presented in Section 7.1.2 below.

7.1.2 Proposed Mitigation Measures During the Planning and Design Phase

Table 3: Proposed mitigation measures during the planning and design phase

Issue/Aspect	Source of Impact	Mitigation Measures	Responsibility
Consultation with landowners (communal and commercial) prior to commencement of the project	• Some landowners could not be reached during the initial consultation period due to late availability of contact details and non-responses to follow-up communication.	• As a matter of good practice, engage with adjacent land users along the pipeline route, even where a registered servitude exists. • Re-contact all affected communal and commercial landowners prior to commencement of construction. • Provide clear project information, including pipeline alignment, access requirements, and construction schedules. • Document all engagement outcomes and address any concerns raised before construction activities begin.	Proponent (Land Rights Division) Project Manager Scheme Superintendent
Land use (agricultural and residential)	• The proposed pipeline alignment traverses commercial livestock farms and communal resettlement farms with residential dwellings and small-scale agricultural activities. • It may result in disruption to farming operations, residential areas, and access to water supply if not properly planned.	• The pipeline alignment must be configured to minimise disruption to livestock farming operations, avoid residential structures and homesteads, and respect existing land-use practices and access patterns. • Design considerations must also ensure continued access to water supply for domestic and small-scale agricultural use within the communal resettlement areas. • Incorporate land access requirements into construction planning to avoid conflicts. • Confirm pipeline alignment to avoid residential structures, yards, and community facilities. • Minimise land take and avoid unnecessary widening of the servitude.	Proponent Design Engineer
Pipeline Alignment & Servitude Compliance	• New pipeline alignment may fall outside the registered servitude or disturb unnecessary land.	• Align the pipeline within the existing registered servitude as far as practicable. • Use the existing farm service track for construction access and long-term maintenance. • Do not expand or alter the servitude unless legally approved through consultation, landowner engagement	Proponent Design Engineer

Issue/Aspect	Source of Impact	Mitigation Measures	Responsibility
		and amendment procedures. • Confirm and document the final alignment clearly on approved design drawings. • Notify and consult affected landowners and the Gibeon Village Council on the alignment and access plan.	
Pipeline exposure at drainage and ephemeral channel crossing	• Erosion, weathering and scouring at drainage channels and tributaries may expose sections of the new pipeline, similar to existing conditions observed on site.	• Identify all drainage channels, ephemeral tributaries, and erosion-prone areas along the pipeline route during the design phase. • Table 4 below presents the coordinates recorded at locations where the existing pipeline is exposed due to erosion, weathering, and scouring at drainage channels and tributaries. These areas indicate where protection measures will be required for the new pipeline to prevent similar exposure. • Incorporate adequate protection measures into the design, including gabion mattresses, gabion retaining walls, stone pitching, or reinforced backfilling. • Extend existing gabion protection structures where required to ensure continuous protection of vulnerable sections. • Ensure that all drainage crossings are designed to withstand peak stormwater flow and prevent pipeline exposure. • Document all protective structures in the final design drawings and ensure inclusion in construction tender specifications.	Design Engineer Project Manager
Provision offtakes on the new pipeline	• The existing pipeline has off-take connections to farms situated on the opposite side of the B2 road. • Farmers and stakeholders expressed concern during authority and public meetings that they would prefer their water meters to be placed on the same side of the road as their properties to improve access and reduce safety	• NamWater should incorporate provisions for off-takes in the design of the new pipeline. • These provisions should cater for both existing customers who wish to relocate their water meters and future new customers (such as villagers or farmers) located closer to the new pipeline alignment. • All off-take designs should consider road safety,	Design Engineer Project Manager

Issue/Aspect	Source of Impact	Mitigation Measures	Responsibility
	risks associated with crossing the national road.	accessibility, and long-term maintenance requirements.	
Planning for construction activities	Poor planning for construction could lead to unnecessary delays.	• The ESMP should be part of the tender/BID documents and contract for the construction contract. • Construction staff members should all be issued with name tags, and uniforms, and all vehicles should be branded/easy to identify. • Before the commencement of construction, NamWater and the Contractor must conduct a field visit together. • The workforce should be accommodated in the towns of Mariental and Gibeon. • Ensure that the contents of the ESMP are understood by the contractor, subcontractors, employees and all personnel who will be present on site.	Project Manager
Compliance	To comply with all legal requirements for the operations of the facility in Namibia.	• Ensure that all the necessary permits from the various ministries and any other bodies that govern the operations are available. • All contracts, permits, certificates and other legal documents on file.	
Environmental Clearance Renewal	Environmental Clearance Certificate expires every three years	Appoint a specialist environmental consultant to update the ESMP and apply for renewal of the Environmental Clearance Certificate.	Proponent

Table 4: Coordinates at existing pipeline exposure points (Erosion- and Scouring-Risk Areas)

Table 4 below provides surveyed coordinate data identifying locations where the existing bulk water pipeline is exposed due to erosion and weathering at drainage crossings and ephemeral tributaries. The positional data (DMS and decimal degrees), elevation, and bearing must be used by the Design Engineer to accurately locate these high-risk areas within GIS platforms and detailed design drawings.

Point ID	Latitude (DMS)	Longitude (DMS)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Elevation (m)	Bearing	Region
Point 1	24°49′51″ S	17°55′15″ E	−24.83083°	17.92083°	1100 m	108° E	Hardap
Point 2	24°50′32″ S	17°55′27″ E	−24.84222°	17.92417°	1100 m	58° NE	Hardap
Point 3	24°59′42″ S	17°54′35″ E	−24.99500°	17.90972°	1080 m	340° N	Hardap

The table should be used to inform the detailed design of the replacement pipeline, specifically to:

- Identify erosion-prone and environmentally sensitive sections of the pipeline corridor;
- Determine appropriate pipeline burial depths at drainage crossings;
- Confirm or adjust the pipeline alignment to minimise future exposure risks;
- Specify site-specific erosion and scour protection measures, including gabions, reinforced bedding, and drainage control structures; and
- Incorporate mitigation requirements into construction drawings, specifications, and bills of quantities.

7.2 CONSTRUCTION PHASE

7.2.1 Environmental Specifications

The following specifications cover the requirements for controlling the impact of construction activities on the natural and social environment. Although the specifications below apply during the construction phase, many of the activities are similar to the operation, maintenance, and decommissioning activities; hence, these specifications, where applicable, will apply to these project phases as well.

7.2.1.1 Construction Camp

- No construction campus should be established along the pipeline route or on the nearby farms.
- Construction workers should be accommodated in Gibeon and Mariental.

7.2.1.2 Access Routes

- Existing maintenance roads must be used as far as possible.
- No off-road driving should be allowed.
- Notices should be placed on visible locations in the vicinity of the construction site to warn the public of construction activities and indicate that heavy vehicles may be using the road.
- Contractor/s shall control the movement of all vehicles and plant machinery so that they remain on designated/demarcated routes.

7.2.1.3 No-go Areas

- Only the existing service road should be used as the working corridor/ working area.
- Any area outside the service road or the demarcated laydown area should be considered a no-go" area.
- The Contractor shall ensure that no unauthorised entry, stockpiling, dumping or storage of equipment or materials shall be allowed within the "no go" areas.

7.2.2 Construction Activities

The construction period, excluding the tender adjudication stage, will be approximately two (2) years, from site establishment to site rehabilitation.

Typical construction activities will include:

- **Transportation** of large volumes of construction materials and labourers;
- **Excavations and earthworks** (e.g., trench digging) using machinery and/or manual methods to prepare the area for pipeline laying;
- **Assembly and placement of pipe segments** using appropriate machinery;
- **Pipeline testing** prior to commissioning;
- **Rehabilitation** of disturbed areas once construction is complete.

Construction at this scale will require a relatively small labour force. The exact workforce numbers are not yet known, but it is expected that non-local workers will be accommodated either in Gibeon or Mariental, while local labour will be prioritised where possible.

7.2.3 Source of Construction Materials

The required pipeline materials will consist of M-PVC pipes (DN200 Class 12 and DN160 Class 9). These materials have been successfully used in previous NamWater projects and are considered durable and reliable. Other general construction materials such as sand, gravel, cement, and stone will be sourced locally where possible.

7.2.4 Electricity Consumption and Requirements

Electricity supply is already available at the boreholes, where it powers the submersible pumps. As there is currently no electrical power supply at the terminal reservoir site, the telemetry communication equipment is powered by solar energy.

The preliminary design report recommends that the electricity supply to the terminal reservoir should be investigated. This will be necessary to power the chlorine dosing pumps and to strengthen security at the reservoir site. Power supply points will be applied for via NamPower. However, details of the power line route are not available at this stage and will need to be determined during detailed design.

7.2.5 Workforce Requirement During Construction

While the exact number of workers is not specified in the preliminary design report, construction of a 53.3 km bulk water pipeline will require a temporary workforce consisting of both skilled and unskilled labour, as well as subcontractors for material supply, transport, and ancillary services.

7.2.6 Workforce Requirement During Operation

The scheme is currently operated by the NamWater Business Unit South under the supervision of the Scheme Superintendent. Operation of the upgraded pipeline will continue under this arrangement, and no additional permanent staff are anticipated beyond the existing NamWater personnel.

7.2.7 Suggested Laydown Areas During Construction

Possible laydown areas for the Orab–Gibeon Pipeline Replacement Project should be identified and selected in consultation with the ECO prior to construction and may include the following:

- **Existing NamWater facilities**, such as:
    - Areas within or adjacent to the Orab Borehole Station, where security, access control, and utilities already exist.
    - Areas within the NamWater premises at Gibeon, near the terminal reservoir and bulk meter chamber.
- **Along the existing pipeline servitude**, where:
    - The ground is already disturbed or cleared.
    - Access is provided via existing service or farm tracks.
    - No additional vegetation clearing or land take is required.
- **Adjacent to access roads or farm tracks**, provided that:
    - The areas are outside drainage lines and flood-prone zones.
    - No protected trees or sensitive habitats are affected.
    - Landowner permission has been obtained where applicable.
- **Temporary construction support areas** near major pipeline sections, used for:
    - Storage of pipes and fittings.
    - Parking of construction vehicles and equipment.
    - Temporary site offices or material stockpiles.

7.2.7.1 Environmental Controls for Laydown Areas

All laydown areas shall:

- Be approved by the ECO prior to use.
- Be clearly demarcated and limited to the minimum required footprint.
- Avoid watercourses, drainage channels, and erosion-prone areas.
- Include appropriate waste management, spill prevention, and housekeeping measures.
- Be rehabilitated to near-original condition upon completion of construction.

7.2.8 Proposed mitigation measures: Construction of the Pipeline (including associated infrastructure) and laydown areas (including concrete batching)

Table 5: General Mitigation Measures

Environmental Issue/Impacts	Source of Impact	Mitigation Measures	Responsibility
Soil Disturbance from civil works and erosion	• Soil is one of the most important natural resources which support a community of diverse organisms. • The excavation of trenches and the movement of construction vehicles will disturb the organisms it contains and expose the soil to wind erosion. • Soil may also be contaminated by leaks and spills from construction vehicles. • Moreover, excavations may also expose the soil to wind and water erosion.	• The topsoil from the construction site must be carefully extracted and kept separate from construction waste for use as backfill material. • Limit the movement of vehicles within the construction working corridor and make use of existing access routes.	Contractor/s
Dust and emissions	• Dust generation from excavation and release of fumes and noxious gases (hydrocarbon vapours, carbon monoxide, sulphur oxides) from vehicles and construction equipment.	Employ dust control measures such as: • Regular dust suppression (e.g., spraying with water), during times of strong winds. • Mixing of cement should be done with a concrete mixture. • Ensure proper maintenance of vehicles and equipment to minimize the release of fumes and other pollutants in the air. • All vehicles should be driven at a minimum speed limit of 60 km/hr in town, and all construction vehicles and machinery must be roadworthy. • Avoid idling of machinery.	Contractor/s

Environmental Issue/Impacts	Source of Impact	Mitigation Measures	Responsibility
		• The Contractor/s shall take all reasonable measures to minimise the generation of dust as a result of construction activity. • Construction vehicles to use only designated roads and to adhere to a speed limit of 40km/hour. • Consider temporarily ceasing of work during high wind conditions. • Personnel are to be issued with dust masks for health reasons (when required).	
Habitat destruction and disturbance and loss of flora	• The project may require some unavoidable removal of shrubs and grasses (those directly affected within the western side of the servitude). • Disturbance to vegetation may also occur because of vehicle movement and off-road driving. • Protected species such as *Boscia albitrunca* (shepherd's tree), *Vachellia erioloba* (camelthorn), and *Aloe viridiflora* occur nearby but are outside the construction footprint.	• During the planning phase of the construction period, the appointed Contractor/s should identify areas for the site office/ construction camp, lay down areas and construction vehicle sites within areas that have no vegetation. • Confine disturbance strictly to servitude; avoid marked protected trees and Aloe stands; train workers not to cut, lean on, or remove plants. Environmental awareness protocols to be enforced. • Only shrubs (in the pipeline route, once the route has been pegged and confirmed) should be cut down, and other trees and shrubs not directly affected should not be cut down. • All disturbances will be limited to the western site of the existing pipeline servitude maintenance zone: • All Contractors and Sub-Contractors must be made aware of their environmental responsibilities and non – compliance and disciplinary actions be applied when unnecessary damage is done. Responsibility for damage must lie with the main contractor, regardless of whether it was done by a sub-contractor, to prevent "passing of the buck".	Contractor/s Environmentalist ECO

Environmental Issue/Impacts	Source of Impact	Mitigation Measures	Responsibility
		• Only use existing service and access roads as far as possible. • Vehicles must be driven by authorised drivers. All employees must be sensitised to minimise disturbances.	
Loss of plants or plant parts due to illegal collection for trade	Collection of plants, parts of plants or seeds for trade by the project workforce/workers.	• No collection of any plants or plant parts should be permitted for trade as materials for housing construction. • Do not disturb, deface, destroy, or remove plants or natural features.	Contractor/s
Disturbance to local fauna	• The affected fauna is up made of farm animals i.e., sheep, goats, cattle and donkeys and of small burrowing animals, insects, beetles and avifauna. • Impacts on fauna may occur due to noise, vibration, dust emission, improper handling of waste and littering during the construction works will also have a serious bearing on the local fauna.	• All disturbances should be limited to the working corridor. • Avoid the use of open fire in the wild. • Only use existing access routes as far as possible. • All employees must be sensitised to minimise disturbances. • Avoid killing or trapping, chasing, or injuring any animal crossing or found along the pipeline route. • Only prepare trenches in short sections sufficient to be worked for a short period i.e., a week, and avoid leaving empty trenches for too long. • Open trenches should be demarcated with danger tapes to ensure the safety of people. • Limit construction to daylight hours. • impose strict speed limits; prohibit hunting or harassment of animals; provide awareness training to workers.	Contractor/s Environmentalist ECO
Impact assessment for the pipeline trench act as a pitfall	• Open pipeline trenches act as pitfalls for small mammals, reptiles, amphibians, or ground-nesting birds during construction.	• Avoid leaving an open trench overnight. • Only prepare trenches in short sections sufficient to be worked for a short period i.e., one day.	Contractor/s ECO

Environmental Issue/Impacts	Source of Impact	Mitigation Measures	Responsibility
		• Leave access ramps at each end of the trench and/or along the trench to facilitate animals exiting the trench; and • Remove and/or assist trapped animals to exit – e.g., create an exit ramp close to trapped animals and guide individual(s) to the ramp. This would not be necessary if the trench is not left open overnight.	
Disturbance to sites of palaeontological and archaeological importance.	Damage and destruction of important palaeontological and archaeological sites could occur during construction.	• Follow the Chance Finding Procedure (Annexure H) which covers actions to be taken on the discovery of a heritage site or object. • Do not disrupt any archaeological or palaeontological sites. Inform the ECO 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.	Contractor/s ECO
Landscape and visual/aesthetic impacts	Visual impacts associated with the construction of the pipeline could occur because of the uncollected waste stockpile, unpacked construction materials, open trenches, and other facilities which makes the view of the site unappealing.	• Only prepare trenches in short sections sufficient to be worked for a day and avoid leaving empty trenches overnight. • The stripped topsoil must be backfilled carefully in position after the completion of the pipe laying. • Waste generated should be stored in enclosed bins and disposed of weekly. • Construction materials should be properly stacked in one place. • The construction area and lay down areas should be kept neat as far as possible.	Contractor/s

Environmental Issue/Impacts	Source of Impact	Mitigation Measures	Responsibility
Erosion	Construction activities could accelerate erosion during construction.	• Runoff on steep inclines should be diverted to prevent the formation of erosion gullies. • Berms should be constructed at selected intervals on long sloping areas to prevent erosion. Diversion berms should be reshaped as necessary to divert runoff. • When equipment crossings are necessary, diversions may be wider with flatter side slopes to minimise erosion. • 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.	Contractor/s ECO
Noise	Generation of noise	• Install and maintain silencers on trucks and machinery. • Repair faulty brakes. • Operators should not use hooters for general communication.	Contractor/s
Driving	Increased risk for accidents	• No operator should operate any equipment when he/she is under the influence of alcohol. • Adhere to safety rules. • Always keep your headlights on. • Drivers must have the correct licence for the vehicle they are driving.	Contractor/s

Environmental Issue/Impacts	Source of Impact	Mitigation Measures	Responsibility

Water requirements and consumption	Construction activities will require a substantial amount of water.	• Employ water-saving measures such as:
		  ○ Re-use water for the least important activities.
		  ○ Use water sparingly.
		• Avoid wastage, spillage, contamination, etc.
			Contractor/s

Concrete batching	Pollution and contamination of the environment may occur as a result of improper handling of concrete.	• Concrete batching shall take place on a smooth impermeable surface enclosed with a bund and in lay down area only. • Batching shall take place at least 20 m away from any water source to avoid contamination. • All wastewater resulting from batching of concrete shall be contained and disposed of appropriately and shall not be discharged into the environment. • Any spillages of concrete shall be cleaned up immediately and disposed of through the solid waste disposal system. • Empty cement bags shall be collected continuously and stored and disposed of appropriately.	Contractor/s Resident Engineer
Fire and explosion hazards	• During construction and operation, fire hazards may arise from welding, grinding, smoking, campfires, faulty machinery, fuel storage, or accidental sparks. In the Gibeon district, where dry wooded veld and grasslands are highly combustible, fires could spread rapidly, destroying natural habitats, loss of biodiversity, soil degradation, and potential property damage. • Uncontrolled fires also pose risks to human health and safety, with possible injuries, fatalities, or displacement of local communities.	• Prohibit open fires, burning of waste, or uncontrolled cooking activities on-site. • Designate smoking areas away from vegetation, with fireproof containers for cigarette disposal. • Cigarette butts must be disposed of in a designated container. • Maintain firefighting equipment (e.g., extinguishers, beaters, water tanks) at all construction sites, camps, and fuel storage areas. • Store fuels, oils, and chemicals in clearly marked, bunded, and fire-resistant areas, away from ignition sources.	Resident Engineer Contractor/s

Environmental Issue/Impacts	Source of Impact	Mitigation Measures	Responsibility
	• Although the risk of explosion is low, the storage and handling of fuels and chemicals at construction sites represent a potential hazard.	• Ensure vehicles and machinery are regularly maintained to prevent sparks or fuel leaks. • Train all workers in fire prevention, firefighting techniques, and emergency response procedures. • Coordinate with the Maritnal Municipality, Hardap Regional council on fire preparedness and response. • In terms of the Atmospheric Pollution Prevention Act (No. 45 of 1965), burning is not permitted as a waste disposal method. • Any fires that occur shall immediately be reported to the RE. • Ensure a designated smoking area far from fire hazard areas such as the workshop and fuel storage areas and any areas where the vegetation or other material is such as to make liable the rapid spread of an initial flame. • There must be a competent fire safety officer who shall be responsible for ensuring immediate and appropriate actions in the event of a fire and shall ensure that employees are aware of the procedures to be followed. • The Contractor shall be equipped with appropriate basic fire-fighting equipment (e.g., fire buckets, extinguishers, fire beaters, etc.) at all times. • In the event of a fire: o Immediately alert all personnel and activate emergency response procedures in Annexure D o Use on-site firefighting equipment to contain small fires; for larger fires, contact the local fire brigade and relevant authorities.	

Environmental Issue/Impacts	Source of Impact	Mitigation Measures	Responsibility
		○ Evacuate personnel if the fire cannot be controlled, prioritising human safety. ○ Contain the affected area by creating firebreaks to prevent further spread. ○ Rehabilitate fire-damaged areas through reseeding or replanting with indigenous vegetation to prevent erosion and promote ecosystem recovery. ○ Conduct incident reporting and root cause analysis to prevent recurrence.	
Criminal activities i.e., theft	Construction materials and untended equipment kept onsite may attract criminals.	• Materials and equipment must not be left on site so that it does not attract criminals. • All criminal activities should be reported to the local police immediately. • Telephone numbers for the local police station are presented in Annexure C.	Contractor/s
Handling of complaints and grievances	A grievance may be received from residents concerning construction activities.	• All complaints and grievances shall be reported in the Form (Annexure G) and submitted to the RE. • The RE shall handle the grievance as per the Grievance response procedure presented in Section11.	Resident Engineer
Worker's Accommodation	Accommodation of workers on site could lead to: • Creation of new access roads, especially if workers are returning home late at night with poor visibility. • An unsanitary environment with the production of domestic grey wastewater.	• The labour force should be sourced locally where possible. The local labour force already resides in the area and would not need to be accommodated on-site. • The labour force sourced outside of the project area should not be accommodated on-site but should rather rent accommodation establishments already existing in Gibeon and Mariental.	Resident Engineer Contractor/s

Environmental Issue/Impacts	Source of Impact	Mitigation Measures	Responsibility
	• Fire breakouts. • Illegal hunting of domestic animals at night.	• Open fires are prohibited at the construction site.	
Establishment of lay - down areas	Unnecessary land disturbance and vegetation clearing for establishment of temporary laydown areas for storage of pipes, equipment, and material	• Obtain ECO approval prior to establishment of any laydown area. • Locate laydown areas within existing disturbed areas, NamWater premises, or along the existing pipeline servitude as per the suggested guidance in provided in Section 7.2.8. • Prohibit laydown areas in flood-prone zones. • Implement basic erosion control measures where required. • Clearly demarcate laydown areas and restrict activities to the minimum required footprint. • Provide waste containers at laydown areas. • Remove waste regularly and dispose of it at approved facilities. • Maintain good housekeeping at all times. • Include laydown areas in routine ESMP compliance monitoring. • Store hazardous materials in designated, bunded areas. • Keep spill kits available at all laydown areas. • Regrade disturbed areas and reinstate natural surface conditions. • Rehabilitate all laydown areas to near-original condition once no longer required.	Resident Engineer Contractor/s; ECO

7.2.9 Waste Generation

Environmental issues/impacts	Source of impact	Mitigation measures	Responsibility
Construction waste management	• Waste will be generated during the construction phase, including domestic waste (non-hazardous), industrial non-hazardous waste (e.g. offcuts, scrap metal, empty containers, packaging, building rubble) and industrial hazardous waste (e.g. hydrocarbon-contaminated materials). • Without proper management, this may result in localised run-off, odours, littering, pollution, and reduced visual amenity.	• All waste generated at the site must be gathered and disposed of at the nearest approved Municipal waste disposal sites (either in Gibeon or Mariental). • Provide sufficient waste bins on site. • No waste should be buried. • Remove all temporary buildings, concrete slabs etc., when construction is completed. • The laydown areas and construction sites must be kept neat. No littering inside the camp must be allowed. Make sure that refuse bins are used. • Recycle or reuse materials where feasible. • Vehicles transporting waste should be sealed with a tarpaulin to avoid waste from being blown by the wind and prevent dust emissions. • After construction, the entire area will be rehabilitated as set out in the ESMP (see Section 7.2.12).	Contractor/s
Litter produced during construction	• Littering (food wraps, paper, plastic etc.) can be blown away into the surrounding environment. • They can also be consumed by animals and lead to death.	• No littering should be allowed. The construction area will be kept free of waste at all times. All construction sites will be cleaned daily before leaving the construction site. • Provide sufficient waste bins at worksites and in laydown areas. • 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 dog-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 is taken to an appropriate waste dump site.	Resident Engineer Contractor/s – ECO

Environmental issues/impacts	Source of impact	Mitigation measures	Responsibility
		• The central waste storage vessel shall be emptied weekly or as necessary. • Vehicles transporting waste should be sealed with a tarpaulin to avoid waste from being blown away by the wind.	
Waste from ablution	• Liquid waste from construction workers will be generated. • All these types of waste will harm surrounding areas if not disposed of properly and regularly.	• Sewage from ablution facilities should be contained in a septic tank and should be disposed of at once full or at least once a week at the nearest wastewater treatment plant in town. • Provide portable ablution facilities in line with GN 121 of 1969 (at least 1 toilet every 500m along the route, and 2 toilets per 25 people, separate for males and females). • Contain sewage in septic tanks and dispose at the municipal wastewater treatment plant. • Train construction staff in proper waste handling and hygiene practices	Resident Engineer /Contractor
Hazardous Waste	Poor handling of hazardous waste which includes fuels, lubrication oils, hydraulic and brake fluid, solvents, paints, anticorrosive, insecticides and pesticides, chemicals, acids etc.	• Used solvents and grease should be stored in drums or other suitable containers. It should be sealed and recycled or disposed of at an appropriate disposal site. • Hazardous substances should be disposed of at designated hazardous disposal sites. • Do not change oil on the uncovered ground. Drip trays will be used to catch oil when vehicles are repaired in the field. • Used oil and hydraulic fluids should not be discarded on the soil or buried. It should be removed from site and taken back to an appropriate dumpsite. • Hazardous waste should not be burnt.	Contractor/s
Fuel and lubricants spill or leaks at construction, refuelling, and storage sites	The poor handling and spillage of fuel, lubricants, and chemicals i.e., oil, grease from construction vehicles could contaminate the soil.	• Drip trays should be provided for vehicles and machines with leakages. • All construction vehicles must be serviced at the maintenance workshop and no offsite maintenance should be allowed. • If refuelling is to be done onsite, fuel tanks should be left in vehicles only and not be offloaded on the ground. A bunding wall, big enough to contain 120% of the volume of the fuel tank	Resident Engineer Contractor/s

Environmental issues/impacts	Source of impact	Mitigation measures	Responsibility

		should be constructed at fuel storage and transfer site/s.
		• All leakages and spillages of oil and grease should be contained, cleaned up, stored in sealed containers and then be disposed of at the Kupferberg landfill site.
		• 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.
		  ○ Do not bury polluted soil, but rather dispose it at an appropriate dump site.
		  ○ Contaminated soil, water and other materials should be stored in sealed containers and dispose it at an appropriate waste dumpsite.
		• Collect contaminated soil, water and other materials and dispose it at an appropriate waste dumpsite.
		• Fire extinguishers must be available at all refuelling sites. Staff should be trained to handle such equipment.
		• Above-ground fuel tanks should be on an impervious floor with bunding walls	

7.2.10 Health and Safety of Construction Workers

Environmental issues/impacts	Source of impact	Mitigation measures	Responsibility
Sexual Exploitation, Abuse, and Sexual Harassment (SEASH) within contractor workforces	• Risk of sexual harassment among workers, including unwanted comments, advances, or gestures. • Potential abuse of power, where supervisors may solicit sexual favours in exchange for employment, overtime, or other benefits. • Sexual exploitation, including transactional sex involving vulnerable community members. • Possibility of coercive or non-consensual sexual behaviour, driven by unequal power dynamics between workers and community members. • Normalisation of harmful sexual behaviour in worker camps due to peer influence, lack of supervision, or poor behavioural controls. • Increased likelihood of HIV/AIDS and STI transmission. • Unplanned pregnancies involving workers or community members. • Potential for social conflict between workers and the host community. • Significant reputational and legal risks for NamWater and Contractor/s if SEASH incidents occur.	• Enforce a Code of Conduct for all workers prohibiting SEASH, transactional sex, harassment, and inappropriate interactions with community members. • Conduct mandatory induction and ongoing training on SEASH, gender-based violence, HIV/AIDS, STI awareness, respectful behaviour, and workers' responsibilities. • Implement a zero-tolerance policy for sexual exploitation, abuse, harassment and coercive behaviour, with clear disciplinary procedures including dismissal. • Establish confidential reporting and grievance mechanisms for workers and community members, with protection for complainants. • Ensure strict supervision of workers, including night-time supervision in worker camps. • Restrict workers from bringing dependents and prohibit informal settlements around construction sites or facilities. • Provide controlled worker accommodation (if applicable) with rules on conduct, curfews, and restricted access to community areas. • Collaborate with local health facilities to provide voluntary HIV testing, counselling and sexual health services. • Conduct regular community awareness sessions on SEASH, rights, reporting channels, and how to report misconduct. • Enforce strict recruitment transparency — no worker may offer or receive sexual favours for employment or benefits. • Ensure contractors have female focal points or social officers	Resident Engineer Contractor/s ECO

Environmental issues/impacts	Source of impact	Mitigation measures	Responsibility
		trained to handle SEASH cases. • Undertake regular monitoring and audits of contractor compliance with SEASH requirements.	
Construction-related injuries.	• Construction-related injuries could occur. • Occupational health hazards are expected, particularly for the construction workers who will be present at the site. • Workers will be exposed to dust, vibrations, high noise levels, sun exposure (sunstroke), and dehydration during the summer months.	• Equip all staff with appropriate PPE and ensure they know how to use it (hard hats, goggles, hearing protectors, dust masks, steel-toed shoes, etc.). • Provide mandatory safety induction and ongoing training, including job-specific hazard awareness and correct handling of fuels, chemicals, machinery, and tools. • Implement a site-specific Health and Safety Management Plan, including Job Safety Analyses (JSAs) for high-risk activities. • Keep comprehensive, fully stocked first-aid kits at all construction points and ensure a trained first-aider and safety representative are always present. • Establish and maintain clear evacuation procedures for seriously injured workers. • Ensure all vehicles and machinery are roadworthy; repair faulty brakes, exhausts, or mechanical defects immediately. • Enforce safe driving practices and adherence to site speed limits to reduce workplace accidents. • Clearly mark all dangerous areas and restrict or control access to hazardous zones. • Provide shade, drinking water, rest breaks, and implement dust suppression to prevent heat stress and reduce exposure to airborne dust. • Store hazardous substances in adequately protected and secure areas to prevent soil, air, or water contamination.	Resident Engineer Contractor/s

Environmental issues/impacts	Source of impact	Mitigation measures	Responsibility
		• Conduct refuelling only at a designated, bunded transfer site (with bunding sufficient for 120% of tank volume). • Ensure fire extinguishers are available at all refuelling points and during all hot works (welding, gas cutting, angle grinding); train workers in their proper use. • Prohibit the disposal of burning or smouldering objects in areas where they may ignite fires; ensure no wildfires arise from construction activities. • Keep work areas clean and orderly; undertake equipment maintenance on concrete slabs to avoid spills and contamination. • Store and handle explosives strictly according to prescribed regulations; keep clear of blasting sites unless authorised. • Develop and practice emergency response procedures for fires, spills, accidents, and worker injuries. • Maintain records of all incidents, accidents, and illnesses on site and present them in safety meetings.	

7.2.11 Socio-economic and Cultural Impacts:

Environmental issues/impacts	Source of impact	Mitigation measures	Responsibility
Social risks – migrant workers, HIV/AIDS, and informal settlements	Arrival of migrant workers and jobseekers during construction, leading to potential casual relationships with community members, unplanned pregnancies, SEASH, increased risk of HIV/AIDS and STIs, and possible formation of informal settlements.	• Encourage the contractor to prioritise local hiring. • Implement SEASH, HIV/AIDS and STI awareness programmes • Enforce a zero-tolerance policy on sexual exploitation, harassment, and abuse. • Enforce a worker Code of Conduct. • Prohibit the establishment of worker camps within settlements; collaborate with local health and social services; monitor and address risks of informal settlements. • Prohibit workers from bringing dependents or establishing informal settlements near the site. • Enforce the confidential grievance and reporting mechanisms for SEASH incidents. • Any employee who commits or attempts to commit a sexual act with a child under the age of 16 years shall be guilty of an offence. This person must be reported to the police immediately. • Non-local employees should be encouraged to return to their original residential areas after completion of the contract.	Contractor/s Resident Engineer
Public safety	• Occupational health and safety hazards for the construction workforce (injuries from machinery, slips and falls, heat stress, noise, dust/fumes, handling hazardous materials) and indirect risks for nearby community members (accidents along access roads, exposure to unsafe work zones. • The safety of the public may also be compromised by certain construction activities i.e., uncovered	• Maintain secure fencing or temporary barriers around work areas to prevent public entry into unsafe zones. • Install warning signage along the pipeline route, especially near excavation areas, open trenches, and machinery zones. • Implement strict traffic management measures on access roads: speed limits, flag personnel, road signage, and designated haul routes.	Resident Engineer /Contractor

Environmental issues/impacts	Source of impact	Mitigation measures	Responsibility
	trenches, an increase in traffic volume generation of dust, noise, and vibration.	• Prevent community exposure to dust, noise, and fumes by applying dust control, scheduling noisy activities during daytime, and providing warnings. • Ensure all hazardous materials, fuels, and chemicals are stored securely to prevent public access or accidental exposure. • Engage the community and local authorities with regular information sharing on construction schedules, risks, and safety precautions. • Prohibit children and community members from entering construction sites through security monitoring and controlled access points. • Respond promptly to any community safety incidents through the grievance and reporting system.	
Heritage impact	• Possible disturbance or loss of unknown archaeological or heritage resources (artefacts, graves, fossils) during excavation and trenching	• Implement and enforce a chance find procedure (Annexure H) • Train workers to recognise heritage materials; stop work immediately upon discovery; notify the National Heritage Council. • Safeguard the find until authorities provide instructions.	Resident Engineer /Contractor

7.2.12 Site Closure and Post-Construction Rehabilitation

Post-construction/maintenance 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 are associated with the Orab – Gibeon pipeline replacement. the project could be mitigated and restored to an acceptable level. Poorly rehabilitated construction areas provide a difficult legacy issue for governments, communities and companies, and ultimately tarnish the reputation of developers.

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

Objectives of proper site closure and rehabilitation include the following:

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

Rehabilitation measures to implement:

a) A site inspection will be held after completion of the project to determine if the necessary rehabilitation work was done. Rehabilitation will be done to the satisfaction of NamWater.
b) Rehabilitation work should be done as soon as construction work is completed.
c) All excess construction material should be removed from construction sites.
d) All newly established roads no longer required must be rehabilitated. Tracks can be rehabilitated by raking the area or dragging tyres or branches (or other suitable material) behind a vehicle. Make sure that the central ridge in the road is removed. Remove all windrows.
e) Remove all waste, rock stockpiles, construction equipment, surplus materials and temporary structures, fences and demarcation material established by the contractor.
f) Breaks up all bunds, and concrete slabs and removes these with all waste concrete to an appropriate waste dump.
g) Make sure all polluted soil is stored in drums and removed to an appropriate waste dump.
h) Make sure all windblown litter is removed.
i) Make sure that all potential hazards (i.e., the sewerage pit) are properly closed and left in a safe and neat position.
j) Newly established borrow pits should be neatly worked off.
k) Repair all fences and gates if damaged by the contractor.
l) All rehabilitated areas shall be considered “no-go” areas, and the Contractor shall ensure that none of his staff or equipment enters these areas.

During operation and pipeline maintenance exercises, the Scheme Superintendent shall conduct a site inspection after every maintenance work and ensure rehabilitation of disturbed areas. Rehabilitation measures during the operation phase will include:

- Clean up all soil pollution during maintenance work and disposal to an appropriate waste dump site.
- Remove all windblown litter once maintenance has seized.
- Remove all potential hazards and ensure the area is left safely and neatly.
- Any temporary work camps/lay down area's setup should be dismantled, and the area rehabilitated as far as practicable, to their original state.
- Pickup all worn-out parts/pieces and pipes which has been replaced.

Table 6: Post construction land restoration management actions

Parameter	Management Action	Responsibility
Overall	Progressive rehabilitation shall be undertaken to minimise the amount of disturbance time. The disturbed area will be re-profiled to original or stable contours, re-establishing surface drainage lines and other land features.	Resident Engineer Construction Contractor/s
Infrastructure	All temporary infrastructure, signage and other installations other than those required for environmental, or safety reasons shall be removed once backfilling and tie-ins are completed.	Construction Contractor/s
Waste	All waste materials (e.g., bags, pegs, skids, pillows) shall be removed from the construction areas once backfilling and tie-ins are completed.	Construction Contractor /s
Soils	Compaction relief shall be undertaken by scarifying or ripping as required along the contours, followed by raking and levelling.	Construction Contractor /s
Erosion	• The beds of watercourses to be restored to the original gradient and the bank to the natural contours post-disturbance. • Backfill crown to be graded and shaped as closely as practicable to pre-existing contours and flow patterns of the riverbed and riparian zone. • Banks to be reinstated in a manner that minimises erosion potential and does not alter natural streamflow - this may include the installation of rock gabions, rip rap, cement/s andhessian bags.	Construction Contractor / s

7.2.13 Proposed Enhancement Measures for Positive Impacts

Table 7: Proposed enhancement measures for positive impacts

Issues	Description	Enhancement measures	Responsibility
Job opportunities	Employment opportunities were created during construction, particularly for unskilled and semi-skilled local labour.	• Prioritise local hiring for unskilled and semi-skilled positions, targeting communities living in Gibeon and at the farms along the Orab–Gibeon pipeline route. • Include specific clauses in tender documents and contracts requiring the Contractor to maximise local labour recruitment wherever feasible. • NamWater to verify contractor labour plans, ensuring they reflect local hiring targets before contract award. • Advertise job opportunities locally through village councils, Traditional Authorities, regional offices, and noticeboards to ensure transparency. • Implement a fair and transparent recruitment process, avoiding discrimination, nepotism, or exploitation. • Provide basic training and capacity building for local workers so they can meet job requirements safely (e.g., PPE use, basic construction skills, safety awareness). • Offer on-the-job skills development, enabling local workers to acquire competencies transferable beyond the project. • Prioritise local small and medium enterprises (SMEs) for the supply of goods and services where possible (catering, transport, small equipment, etc.). • Maintain a record of all employment statistics, including the number of local vs. non-local hires, gender distribution, and skill categories. • NamWater to monitor contractor compliance with labour commitments through regular site audits and monthly reporting. • Promote gender inclusion by encouraging the employment of women in appropriate roles and ensuring equal pay for equal work. • Ensure safe working conditions, fair wages, and lawful labour practices, in	Project Manager/Contractor/s/ Resident Engineer

Issues	Description	Enhancement measures	Responsibility
		accordance with the Labour Act and relevant NamWater policies. • Avoid labour influx by discouraging walk-in jobseekers through prior communication that recruitment will be done locally. • Ensure no child labour, forced labour, or exploitative labour practices occur on the project.	
Business opportunities	• The construction works will create business opportunities for consultants, building Contractors, and local suppliers of building materials. • Other local businesses, such as hotels, guest houses, and informal food vendors, will also benefit indirectly from the construction works.	• Qualified Namibian construction companies should be given a fair chance to compete in the bidding process, in accordance with the Public Procurement Act 15 of 2015. • Building materials must be sourced from local businesses as far as possible.	Contractor/s/ NamWater Internal Procurement Committee
Economic prosperity	• During the construction phase, it is expected that the local economy will be beneficially impacted by increased temporary employment opportunities and business opportunities. • Improved water security will contribute to the growth of the local economy by attracting investments and development in the area.	• Local people and businesses must be given a fair chance to benefit from the project.	Head: Business Unit South Resident Engineer
Provision of water supply	One of the significant positive impacts that will result from the proposed project is the improved and reliable water supply to the area.	• Ensure timely fixing of leaks and breaks on the pipeline to minimise water supply interruptions. • Residents must be sensitised to use water sparingly	Head: Business Unit South Planning Division

7.3 OPERATION AND MAINTENANCE PHASE

7.3.1 Operational Phase

During the operational phase, the following activities are anticipated:

- **Clearance of obstructions** along the pipeline servitude to ensure accessibility and protect the integrity of the infrastructure.
- **Regular inspections** of the underground pipeline to check for leaks, illegal off-takes, and other issues.
- **Maintenance and repair activities**, including fixing leaks and addressing defects to minimise water losses and ensure continuous supply.
- **Provision of new water connections** where required, in line with community and farming needs, subject to NamWater approval and capacity.
- **Removal of unauthorised structures** that may be built unknowingly above the underground pipeline alignment, in order to maintain the servitude and ensure safety.

Proposed mitigation measures: The operation and maintenance phase are presented in Table 8

7.3.2 Proposed Mitigation Measures: Operation and Maintenance Phase

Table 8: Proposed mitigation measures: Operation and maintenance phase

Environmental Issue/Impacts	Source of Impact	Mitigation Measures	Responsibility
Biophysical	Disturbance to local flora and fauna	• Existing maintenance roads should be used as far as possible. • All vehicles should be driven at a minimum speed limit of 60 km/hr.	Scheme Superintendent
	Soil disturbances and contamination.	• Soil disturbance from this activity is expected to be minimal. • Contaminated soil must be cleaned up and disposed of appropriately at the nearest dumpsite.	Scheme Superintendent
	Damage to geological resources.	• Excavations will only be necessary for the repair of burst pipes. Hence, disturbance from this activity is expected to be minimal.	Scheme Superintendent
	Fuel and lubricants spills or leaks.	• All leakages and spillages of oil and grease should be contained, cleaned up, and disposed of at the Kupferberg Waste Disposal Site.	Scheme Superintendent
	Dust and air pollution	• All vehicles and machinery must be roadworthy, and driving speed limits should be adhered to. • Maintenance and repair will be concessionary, hence the limited impacts. • All silencing mechanisms on all equipment must be in a good state of repair. • All routine maintenance shall be restricted to daylight hours.	Scheme Superintendent
	Waste generation	• General household waste should be disposed of in the municipal refuse bins for disposal. • Worn-out parts can be collected and sent to the local scrap yards. • All empty disinfectant containers should be sent to the local	Scheme Superintendent

Environmental Issue/Impacts	Source of Impact	Mitigation Measures	Responsibility
		recycling companies or properly cleaned before re-use. • Hazardous waste such as used oil, paints, unused chemicals, etc., should be collected separately and sent to the nearest approved hazardous waste site.	
Socio-economic	Land-use effects	• Use existing maintenance roads as far as possible and no off-road driving should be allowed.	Scheme Superintendent
	Safety, security, and health hazards.	• Employees should be equipped with appropriate PPE. • All trenches should be covered after the completion of maintenance work. • Uncovered trenches must be barricaded with caution tape and restricted access encouraged.	Scheme Superintendent
	Landscape impacts	• Backfill all trenches/excavations. • Waste generated should be collected and disposed of regularly.	Scheme Superintendent
Nuisance	The potential source of a nuisance during the operation phase is excessive noise from running pumps, especially if not properly maintained.	• The pumps are to be housed in one single room, hence the noise generated will not be emitted to the surroundings. • The combined noise produced in the pump station should not exceed 85dBA as recommended by the National Labour Act.	Scheme Superintendent
Public health and safety risks	• The Gibeon Water Supply Scheme maintenance staff are at risk of numerous risks such as the presence of disease-carrying vectors i.e., flies, mosquitoes	• Maintenance staff must be made aware of potential occupational health hazards associated with their jobs. • Employees must be equipped with appropriate PPE suitable for each task undertaken. • Keep the area clean and tidy by removing waste and unwanted vegetation.	Scheme Superintendent

Environmental Issue/Impacts	Source of Impact	Mitigation Measures	Responsibility
Waste generation	The operation of the Gibeon Water Supply Scheme will result in the generation of different types of waste from different plant operational activities, such as. • General household waste from office operations and operator houses. • Worn-off parts from maintenance and repair of plant infrastructures, pipelines, vehicles, and equipment. • Lubricants for the maintenance of vehicles and equipment. • Building rubble from renovations • Empty containers and packaging materials.	• Compile an inventory of all types and quantities of waste generated at the site. • Provide adequate and separate waste handling facilities for each waste type at the site and ensure regular collection and disposal. • Follow the waste management hierarchy in managing waste, as follow: **Avoid- Reduce- Reuse-Recycle- Recover- Treat-Dispose.** • General household waste, debris from the building rubble, and worn-out non-metallic parts must be disposed of at the nearest town waste disposal site. • Metallic worn-out parts should be taken to the nearest scrap yards for recycling. • Empty containers which contained hazardous chemicals should be taken to the nearest Hazardous Waste site.	Scheme Superintendent
Risk of fire	Sources of fire outbreaks during operations could be electrical shocks and due to the presence of flammable and combustible items i.e., fuel.	• Ensure that all firefighting devices are in good working condition and are serviced. • A holistic fire protection and prevention plan are needed. This plan must include an emergency response plan, firefighting plan, and spill recovery plan. • Maintain regular site, mechanical and electrical inspections and maintenance. • Clean up and contain all oil spills/leaks.	Scheme Superintendent
Visual Impact	Improper handling of waste in and around the site could compromise the aesthetic view of the place.	• Ensure regular waste disposal, at least weekly. • Ensure good housekeeping and routine maintenance of infrastructures and surroundings.	Scheme Superintendent

Environmental Issue/Impacts	Source of Impact	Mitigation Measures	Responsibility
Emergency response	An emergency may occur may time during the operation and maintenance phase and may affect the water supply scheme operation and disrupt the quality and quantity of water supply to the area.	• Emergencies shall be handled as per the Emergency Response Plan (ERP) presented in Section 10.	Scheme Superintendent
Exposure to chlorine and other hazardous substances during operation and maintenance activities.	• **Storage and handling of chlorine containers** – Moving, lifting, or connecting gas cylinders or drums. • **Leaks from chlorination equipment** – Faulty valves, corroded fittings, damaged hoses or dosing lines. • **Manual cylinder changeover and maintenance work** – Workers working close to pressurised gas, often in small plant rooms. • **Inadequate ventilation in the chlorination room** – Build-up of chlorine gas if there is a slow leak or accidental release. • **Operational errors** – Incorrect dosing, opening the wrong valves, poor isolation procedures, or bypassing safety devices. • **Human factors** – Lack of awareness or training, poor use of PPE, physical fatigue, and complacency during routine tasks. • **Transport of chlorine to the Gibeon reservoir** – Cylinder damage or leaks during loading, off-	• Provide a well-ventilated chlorination room with leak detectors and secure storage for cylinders. • Use corrosion-resistant fittings, proper mounting and safe dosing equipment. • Restrict access to trained and authorised personnel only. • Implement SOPs for cylinder handling, storage, transport, start-up/shutdown, and inspections. • Provide appropriate PPE (chemical gloves, goggles/face shield, protective clothing, safety boots). • Maintain a self-contained breathing apparatus/respirator for emergency response. • Conduct regular training on chlorine hazards and emergency procedures. • Maintain a permit-to-work system for maintenance activities. • Keep spill kits, emergency eyewash and a safety shower on site. • Conduct emergency drills and maintain a Chlorine Emergency Response Plan. • Monitor chlorine residuals in water and keep records of inspections, incidents and corrective actions. • Ensure compliance with relevant OHS, NamWater standards and legal requirements.	Scheme Superintendent

Environmental Issue/Impacts	Source of Impact	Mitigation Measures	Responsibility
	loading or transport on access roads.		
Handling of complaints and grievances	A grievance may be received from residents, or customers with regards to operation or maintenance.	• All complaints and grievances shall be reported in the Form (see Annexure G) and submitted to the Scheme Superintendent.	Scheme Superintendent

8 DECOMMISSIONING AND LAND RESTORATION

8.1 DECOMMISSIONING OF THE NEWLY CONSTRUCTED PIPELINE

The decommissioning of the proposed new pipeline is not foreseen during the validity of the Environmental Clearance Certificate (ECC), as it is designed for long-term operation. Should decommissioning occur at any stage in the future, a separate ESMP will be required and must be commissioned by the proponent.

8.1.1 Decommissioning of the Existing Old Pipeline.

Once the new pipeline has been commissioned, the existing pipeline will remain in situ, and the switchover will be managed in a way that ensures no interruption of water supply.

It is important to note that only certain sections of the existing 53.3 km pipeline are made of asbestos cement (AC) pipes, while other sections are constructed of uPVC.

Typical methods of pipeline decommissioning include:

- Dismantling – physical removal of pipeline components.
- Local decommissioning – involving pigging, segmenting, plugging, and filling of the pipeline; and
- Abandonment in place – leaving the pipeline underground.

For this project, the preferred approach is to leave the existing pipeline in the ground, as this minimises disturbance to the surrounding environment, avoids unnecessary excavation impacts, and is more cost-effective for the proponent. Should sections of AC pipe require removal, this must be undertaken by an approved Inspection Authority for Asbestos Contractor in accordance with the Ministry of Labour and Employment Relations requirements and the ESMP.

8.1.1.1 Demolition or Dismantling of the Existing Old Pipeline.

Provisions for decommissioning are included here for completeness, should it become necessary at any stage in the future. The existing 53 km pipeline comprises a mix of asbestos cement (AC) and uPVC sections:

- 20 km of Class 18 AC (first section),
- 20 km of Class 9 uPVC (middle section), and
- 13 km of Class 12 AC (last section).

The uPVC sections do not pose significant hazardous waste risks and can be removed, recycled, or abandoned in situ with standard handling and disposal procedures.

The AC sections, however, are classified as hazardous material due to their asbestos content. These pipes are over 40 years old and have become friable, increasing the risk of fibre release. If removal of these sections is required, strict controls will be necessary as per the proposed decommissioning mitigation measures for the exisitng asbestos pipeline in Table 9

Table 9: Proposed decommissioning mitigation measures for the exisitng asbestos pipeline

Environmental Issue/Impacts	Source of Impact	Mitigation Measures	Responsibility
Demolition or dismantling of existing asbestos cement (AC) pipeline	Removal or disturbance of ageing asbestos cement pipeline sections may result in release of asbestos fibres, posing health risks to workers and the public, and causing environmental contamination.	• Only decommission the existing AC pipeline if removal becomes unavoidable. • Implement all asbestos handling, removal and disposal procedures as detailed below: • Appoint an approved Inspection Authority and licensed Asbestos Contractor authorised by the Ministry of Labour and Employment Relations. • Apply controlled removal techniques to minimise fibre release (no cutting, breaking or dry handling). • Restrict public access to work areas through fencing, barricading, and clear warning signage. • Package, label, and transport asbestos waste in accordance with hazardous waste regulations. • Dispose of asbestos cement waste only at approved hazardous waste disposal facilities in Windhoek. • Provide and enforce the use of appropriate PPE, including respirators, gloves, and protective clothing for all workers involved. • Maintain detailed records of asbestos removal, transport and disposal for regulatory compliance and audit purposes.	NamWater; Licensed Asbestos Contractor; Resident Engineer; ECO

8.1.2 Safety and Health Hazards

The safety of residents living in the proximity of the site and the employees could be compromised by workplace hazards. All employees should be equipped with appropriate PPE. The site should be fenced off and out of bounds during the demolition work.

8.1.3 Visual/Aesthetic Impacts

If the existing infrastructure is kept for many years without any repair, it will deteriorate and may become an eyesore.

Building rubble and other general waste should be disposed of at the nearest approved dumpsite.

Hazardous waste i.e., AC materials, should be handled by an approved Contractor and disposed of at the approved site.

The Environmental Management Plan for this phase will have to be reviewed and updated at the time of decommissioning to cater for changes made to the development.

8.2 POST DECOMMISSIONING REHABILITATION

Rehabilitation is defined as the process of taking all the necessary actions to repair the damaged environment in-order to make the land suitable for other uses or to simply beautify the affected area. In this case, the rehabilitation will entail clean-up, treatment, or restoration of contaminated areas (e.g., contaminated soils by oil or fuel spills, concrete spills, etc.) and refilling of excavated pits with the overburden. Upon commencing of construction works, the ECO and RE shall conduct a site inspection and instruct the responsible contractor to do the following:

- Removal of all waste produced to be disposed of appropriately.
- Rehabilitate the disturbed areas and refill of excavations.
- Clean up all spills and leave the area safe and tidy.

During the operation phase, the Scheme Superintendent shall conduct a site inspection after every maintenance work and ensure rehabilitation of disturbed areas. Rehabilitation measures during the operation phase must include:

- Clean up all soil polluted during maintenance work and disposal to an appropriate waste dump site.
- Remove all windblown litter once maintenance has seized.
- Remove all potential hazards (i.e., the sewerage pit) and ensure the area is left safely and neatly.
- Any temporary work camps setup should be dismantled, and the area rehabilitated as far as practicable, to their original state.
- Driving vehicles in newly rehabilitated areas should be prohibited.
- Temporary access roads not required for long-term maintenance access should be closed and rehabilitated to a condition compatible with the surrounding land use.
- Signage should be erected where access routes are to be retained but are not public access.

Table 10: Rehabilitation management actions

Parameter	Rehabilitation Management Action	Responsibility
Overall	Progressive rehabilitation shall be undertaken to minimise the amount of disturbance time. The disturbed area will be re-profiled to original or stable contours, re-establishing surface drainage lines and other land features.	Construction Contractor
Infrastructure	All temporary infrastructure, signage and other installations other than those required for environmental or safety reasons shall be removed once backfilling and tie-ins are completed.	Construction Contractor
Waste	All waste materials (e.g., bags, pegs, skids, pillows) shall be removed from the construction areas once backfilling and tie-ins are completed.	Construction Contractor
Soils	Compaction relief shall be undertaken by scarifying or ripping as required along the contours, followed by raking and levelling.	Construction Contractor
Erosion	Backfill crown is to be graded and shaped as closely as practicable to pre-existing contours and flow patterns of the riverbed and riparian zone.	Construction Contractor
Erosion	Banks are to be reinstated in a manner that minimises erosion potential and does not alter natural streamflow - this may include the installation of rock gabions, rip rap, cement/s and hessian bags.	Construction Contractor

9 ENVIRONMENTAL MONITORING

To ensure continual improvement in environmental performance and reduce adversity of potential negative impacts, it is advisable to keep monitoring the identified environmental receptors.

9.1 MONITORING DURING THE CONSTRUCTION PHASE

Monitoring of all activities during the construction period will be under the responsibility of the Contractor, whose environmental performance will be controlled by the RE, Environmentalist, ECO and NamWater's Environmental Section.

Table 11: Monitoring plan during construction

Element	Location	Type of monitoring	Frequency of monitoring	Purpose of monitoring
Dust	At the construction sites	Visual monitoring	During periodic site visits	To ensure adherence to environmental protection requirements
Wastewater flows generated at the construction sites	At the construction sites	Visual monitoring	During monthly site visits	To ensure adherence to environmental protection requirements
Collection of solid waste	At the construction sites	Visual monitoring	During periodic site visits	To ensure adherence to environmental protection requirements
Use of dangerous materials (paints with heavy metals, lead compositions, cement slabs, pipes, inflammable, toxic substances, etc.)	At the construction sites with the right documentation	Visual monitoring and study of documentation	Each month	To ensure adherence to environmental protection requirements
Protective measures at the construction site	At the construction sites with the right documentation	Visual monitoring	Each month	To ensure adherence to environmental protection and safety requirements
Earth restoration after excavation works	At the construction sites	Visual monitoring	After construction works	To ensure adherence to environmental protection requirements

Element	Location	Type of monitoring	Frequency of monitoring	Purpose of monitoring
Noise & vibrations resulting from equipment work	Project area/close to settlements	Portative noise metering device	During periodic site visits, daily	To ensure adherence to environmental protection requirements
Traffic operation /movement	At the construction sites	Visual monitoring of machinery and trucks carrying construction materials	During periodic site visits	To ensure adherence to environmental protection requirements
Vehicle and pedestrian safety when there are no construction activities	At the construction sites	Visual monitoring by a supervisor	On a daily basis during the construction phase	To ensure adherence to requirements

9.2 MONITORING DURING THE OPERATION PHASE

During the operation phase, the Scheme Superintendent must ensure that compliance monitoring is conducted at different intervals/frequencies throughout the Orab – Gibeon pipeline operational life span as indicated in the table below.

Table 12: Monitoring plan during the operation phase

The issue to be monitored	Monitoring Objectives	What needs to be monitored	Frequency and Means of Monitoring
Production and distribution losses	Prevent water wastage and ensure water conservation.	Overflows, leakages, pipe bursts, etc.	Daily inspections and meter reading
Public Health risks	Operate the Ondangwa to Omutsegwonime pipeline replacement in an environmentally friendly and socially acceptable manner.	Reeds and overgrown vegetation. Presence of mosquitoes, snakes, rodents, etc.	Monthly inspections and physical observation.
Occupational health risks	Ensure health and safe working conditions	Chemical exposure and the presence of health hazards	Daily physical observations.
Water quality	Supply of safe and quality drinking water in line with the Water Quality Guidelines of the Water	Physical quality of raw, settled, and treated water (Chlorine level, N.T.U, pH, Conductivity, and	Daily water sampling and testing.

The issue to be monitored	Monitoring Objectives	What needs to be monitored	Frequency and Means of Monitoring
	Act.	Temperature). Microbiological/ bacteriological quality (Free Chlorine, Heterotrophic Plate count, Total Chlorine, Coliforms & Faecal Coliforms).	-Monthly sampling and laboratory testing
Water Balance	Ensure the water security of the supply area.	Production figures vs. sales figures and demand management	Monthly water balance checks.
Waste management	Prevent environmental pollution and contamination.	Litter, chemical storage & handling, cleanliness, and chemical composition of sludge.	-Daily inspections and physical observation.
Implementation of the ESMP	Ensure compliance to this ESMP and adherence to the regulative measures during planning & design, construction, operation, maintenance, and decommissioning of the envisaged Orab – Gibeon pipeline replacement.	Implementation of specified measures and compliance to the ESMP and other relevant legal requirements.	Biannual environmental report to MEFT.

10 EMERGENCY RESPONSE PLAN

10.1 TYPES AND EFFECTS OF EMERGENCIES

Emergencies can occur at any time or place, either during the construction, operation, or maintenance of the replacement pipeline for the Gibeon Water Supply Scheme. These emergencies may affect the Gibeon Water Supply Scheme's operation and disrupt the quality and quantity of water supply to the area. Some of the emergencies which are associated with the proposed construction, operation, maintenance, and decommissioning of the Orab – Gibeon pipeline replacement and pump station are as follows.

- Substance spillage i.e., oil, concrete, chemicals, etc.
- Construction accidents
- Fire outbreak
- Power failure
- Equipment failure

10.2 SOURCES OF EMERGENCIES

10.2.1 Accidents

Accidents may occur during construction, operation, or maintenance activities, potentially resulting in unavoidable interruptions to the Gibeon Water Supply Scheme pipeline, personal injury, and/or property damage.

10.2.2 Faulty Maintenance

Faulty or inadequate maintenance may cause unexpected breakdowns in the Gibeon Water Supply Scheme pipeline, directly affecting its operation and reducing its overall lifespan. While good maintenance ensures that the infrastructure performs as intended throughout its design life, poor or inconsistent maintenance accelerates deterioration and increases the likelihood of failures.

Although some breakdowns can be addressed during routine repair programmes and may not constitute emergencies, the frequent recurrence of such failures compromises the continued reliable operation of the pipeline. Persistent breakdowns may ultimately result in an emergency condition requiring immediate intervention to restore normal service.

10.2.3 Negligent Operation

Certain operational procedures must be followed to ensure the satisfactory performance of the Gibeon Water Supply Scheme pipeline. Failure to correctly adhere to established procedures constitutes negligent operation. Although negligent operation may be less immediately noticeable than faulty maintenance, the resulting emergency conditions can be more severe, as operational failures may occur before the negligence is detected.

The Scheme Superintendent is responsible for ensuring routine maintenance of the Gibeon Water Supply Scheme pipeline. This includes maintaining an adequate supply of frequently replaced parts and ensuring that sufficient treatment chemicals are stocked to sustain operations for a minimum of 30 days.

10.2.4 Emergency response procedures

10.2.5 Response Priorities

Depending on the nature of the emergency, the following response plan must be implemented as an integral part of the Gibeon Water Supply Scheme's routine operations to lessen the severity of the emergency. All response actions should be geared toward the following priorities, in the order of importance:

- Safety of People (always First)
- Protection of the Environment
- Protection of Assets and Infrastructure

Table 13: Emergency Types, Response Actions, and Responsible Parties

Type of Emergency	Response Actions	Responsible
Substance Spill (concrete, oil, chemicals, fuel, etc.)	• Stop and control the spill at the source immediately. • Contain the spill using drip trays, sumps, absorbents, or approved containment methods to the satisfaction of the Resident Engineer (RE). • Clean the affected area with water or an approved cleaning product. • Remove contaminated soil and dispose of it at the nearest municipal waste disposal site. • Repair the leaking vehicle or machinery; do not use it until it is safe. • Report the incident to the RE and record it in the site logbook. • Ensure spill kits are available at the construction site and at NamWater offices in Mariental (operation phase). • Ensure at least one trained hazmat responder is present. • Refuelling vehicles must be equipped with specific spill kits.	Contractor Safety Representatives Resident Engineer
Power Failure / Electrical Failure	• Ensure an emergency power supply capable of maintaining minimum operations is available. • Test emergency power equipment monthly and document results. • Determine if the power failure is local or regional. • If town-wide, contact Southern RED. • If local, inspect the internal system and restart safely. • Notify critical customers if prolonged outages are expected. • Record the incident in the power supply logbook.	Scheme Superintendent
Fire Outbreak	• Follow the comprehensive Fire Response Plan in Annexure D. • Prioritise evacuation and safety of personnel.• Use appropriate fire extinguishers. • Notify Emergency Services and Scheme Superintendent immediately.	Scheme Superintendent
Chemical Leakage (Chlorine, CO_2, etc.)	• Ensure chemical storage rooms meet legal ventilation requirements. • Wear a face mask with a gas-and-particle protection filter (B2P3) before entering the affected area. • Evacuate all persons from the room. • Shut all dosing system valves. • Check the information displayed on the dosing system control panel.	Scheme Superintendent

Type of Emergency	Response Actions	Responsible
	• Isolate faulty dosing equipment and replace the leaking cylinder. • Record the incident in the chemical incident report form.	
Accident / Injury to Personnel	• Ensure the injured person receives immediate medical attention. • Assess their condition (breathing, pulse, injuries). • Notify the First Aid Officer. • Assist First Aid Personnel where required. • Record the incident in the incident report form. • Report the incident to the Scheme Superintendent.	Contractor Scheme Superintendent
Equipment Failure (pump failure, loss of pressure, mechanical breakdown)	• Analyse the cause of the emergency by checking the SCADA system. • Check pump flow rates to identify faults. • Switch on the standby pump if available. • Notify the Technical Maintenance Team for immediate intervention. • Record the failure in the operations log.	Scheme Superintendent
Pipeline Rupture / Major Leakage	• Immediately isolate the affected pipeline section. • Shut down upstream and downstream valves. • Divert the water supply where possible to maintain service. • Deploy repair teams with appropriate PPE. • Assess risks to people, livestock, and property. • Notify the Scheme Superintendent and the Village Council for public communication if supply interruption is expected.	Scheme Superintendent Technical Maintenance Team
Natural Hazards (flooding, storm damage, erosion, scouring)	• Evacuate personnel from unsafe areas. • Suspend all work in affected zones. • Inspect the pipeline for exposure, erosion, or damage. • Implement temporary protection measures (sandbags, barriers). • Notify the Technical Maintenance Team.	Scheme Superintendent
Vehicle Accident (involving operational personnel or equipment)	• Stop all activities and secure the accident scene. • Provide First Aid if safe. • Notify Emergency Services immediately. • Document damages and injuries. • Report the incident to the Scheme Superintendent and record in the	Contractor / Scheme Superintendent

Type of Emergency	Response Actions	Responsible
	logbook.	
Vandalism, Theft, or Sabotage	• Secure the affected area to prevent further damage. • Notify the Scheme Superintendent and Village Council. • Report the incident to the Namibian Police. • Assess the damage and initiate emergency repairs. • Record the incident.	Scheme Superintendent

11 GRIEVANCE MECHANISM

A complaint/grievance is hereby defined as any complaint or misunderstanding arising from the interpretation, application, observance, or enforcement of the project's environmental and social performance requirements. This procedure outlines the process for receiving and dealing with concerns and complaints from employees and members of the affected public relating to the construction, operation, maintenance, and decommissioning of the Orab–Gibeon Pipeline Replacement Project, and forms part of the formal Grievance Mechanism to be implemented throughout all project phases.

11.1 PURPOSE OF THE GRIEVANCE MECHANISM

The purpose of the Grievance Mechanism is to:

- Provide an accessible, safe, and fair platform for all stakeholders to raise concerns about project activities.
- Ensure timely and effective resolution of grievances to prevent conflict and reduce risks to people, property, and the project.
- Strengthen accountability and transparency between NamWater, the Contractor, workers, and the affected communities.
- Reduce the likelihood of disputes, project delays, and reputational harm.
- Support compliance with Namibian legislation, ESMP commitments, and good industry practice.

11.2 DEFINITION OF A GRIEVANCE

A grievance is any complaint, concern, dissatisfaction, or perceived harm expressed by an individual or group affected by the project.

A grievance may relate to:

- Environmental impacts (dust, noise, access obstruction, vibration).
- Occupational health and safety concerns.
- Labour and working conditions.
- Sexual Exploitation, Abuse and Sexual Harassment
- Contractor behaviour or misconduct.
- Property damage, land access, or servitude issues.
- Traffic and road safety.
- Corruption or unfair recruitment practices.

Grievances may be verbal or written, anonymous or identified, and submitted by community members or workers.

11.3 ROLES AND RESPONSIBILITIES FOR THE GRIEVANCE PROCEDURE

11.3.1 NamWater (Project Manager)

- Overall oversight of the grievance system.
- Ensure the Contractor implements the mechanism correctly.
- Review monthly grievance reports.
- Handle grievances involving Contractor misconduct or unresolved cases.
- Facilitate engagement with Traditional Authorities, Local Authorities, and regulatory bodies when required.

11.3.2 Resident Engineer

The Resident Engineer is responsible for receiving and handling complaints and must ensure that:

- All complaints are taken seriously and dealt with appropriately.
- Any immediate actions required are implemented.
- All complaints are investigated to identify the remedial actions required, the root cause, and preventative measures necessary to avoid recurrence.
- Any actions requiring approval are addressed promptly, added to the Site Improvement Plan, and actioned in a timely manner in collaboration with the ECO.
- A record is made of all complaints, along with any response and/or actions taken (Annexure G).
- Complaints records are periodically reviewed to identify trends and appropriate steps required.
- A lockable grievance/complaint/suggestion box (specifically assigned to this project) is available on site and at NamWater Offices in Mariental for anonymous submissions.
- The grievance boxes are opened periodically (bi-monthly).

11.3.3 Contractor

- Operate the grievance system on site.
- Receive, record, investigate, and resolve grievances from workers and community members.
- Designate a Grievance/Community Liaison Officer (CLO).
- Report all serious incidents (SEASH, safety violations, legal breaches) immediately to RE.
-

11.3.4 Grievance Officer / Community Liaison Officer (ECO)

- Serve as the primary point of contact for grievances.
- Maintain the complaint register and ensure proper documentation.
- Ensure confidentiality and appropriate data handling.
- Provide timely feedback to complainants.
- Escalate complex or unresolved grievances to senior management or RE.

11.3.5 Members of the Public

- Report complaints/grievances in person to the Community Liaison Officer at project site or during information sharing meetings.
- Report complaints/grievances in writing and submit them into the grievance/complaint box at NamWater offices in Mariental

11.3.6 Employees (including Contractors)

All employees, including contractors, must:

- Report any complaint received to the RE immediately; such complaints shall be recorded and tracked in the log sheet maintained by the RE.
- Report any incident which may cause a nuisance or give rise to a complaint to the RE immediately.
- Write their complaint/grievance (using the form in Annexure G) and submit it to the RE or into the grievance/complaint box anonymously.

11.4 GRIEVANCE MANAGEMENT PROCESS

The grievance management process will follow these steps:

Step 1: Submission of Grievance

Complaints may be submitted via:

- Phone, SMS, WhatsApp
- Email
- Suggestion boxes at site offices
- Directly to the Grievance Officer or CLO
- Community meetings or site visits
- Worker feedback channels
- Anonymous grievances must be accepted.

Step 2: Acknowledgement

- Grievances must be acknowledged **within 48 hours**.
- Provide the complainant with a reference number for tracking (if identified).

Step 3: Assessment and Investigation

- Investigate and assess the complaint within **7 working days**, depending on complexity.
- Consult relevant departments, witnesses, or technical staff.
- For SEASH cases, follow a **survivor-centred approach** and ensure confidentiality.

Step 4: Corrective Action and Resolution

- Determine appropriate corrective action in consultation with NamWater and the Contractor.
- Implement actions promptly and document outcomes.
- Provide feedback to the complainant.

Step 5: Closure

A grievance is closed when:

- The complainant accepts the resolution; or
- Final management review confirms all reasonable actions have been taken.

All closure decisions must be documented.

11.5 COMPLAINT REGISTER

The Contractor must maintain a **Complaint Register** containing:

- Unique grievance reference number
- Date received
- Complainant details (unless anonymous)
- Description of grievance
- Category (environmental, labour, SEASH, safety, etc.)
- Assigned staff responsible for follow-up
- Investigation findings
- Action taken
- Date resolved / closed

The register must be available to NamWater and the Environmental Authorities.

11.6 CONFIDENTIALITY AND DATA MANAGEMENT

- All grievance information must be kept confidential and stored securely.
- Personal information must only be shared with authorised personnel.
- Sensitive grievances (e.g., SEASH, harassment, medical issues) must be handled discreetly and ethically.
- Anonymous grievances must be treated with equal seriousness.

11.7 CONFLICTS OF INTEREST

- Grievances involving supervisors or senior staff must be investigated by a neutral or higher-level authority.
- The Grievance Officer must recuse themselves from any case where they have a personal or professional conflict of interest.
- NamWater may appoint an external investigator for serious or sensitive cases.

11.8 PROTECTION FROM RETALIATION

- Complainants must not face dismissal, threats, discrimination, or punishment for raising grievances.
- Contractors must adopt a zero-tolerance policy for retaliation.
- SEASH-related grievances must include additional survivor protections, including safe reporting channels.
- Workers and community members must be informed of their right to raise grievances without fear.

11.9 GRIEVANCE PROCEDURE

Upon receipt of the registered grievance forms, the Resident Engineer or Scheme Superintendent shall screen and assess to 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 and the decision should be communicated to the aggrieved person. See Figure 7 below for the graphical representation of the grievance procedure.

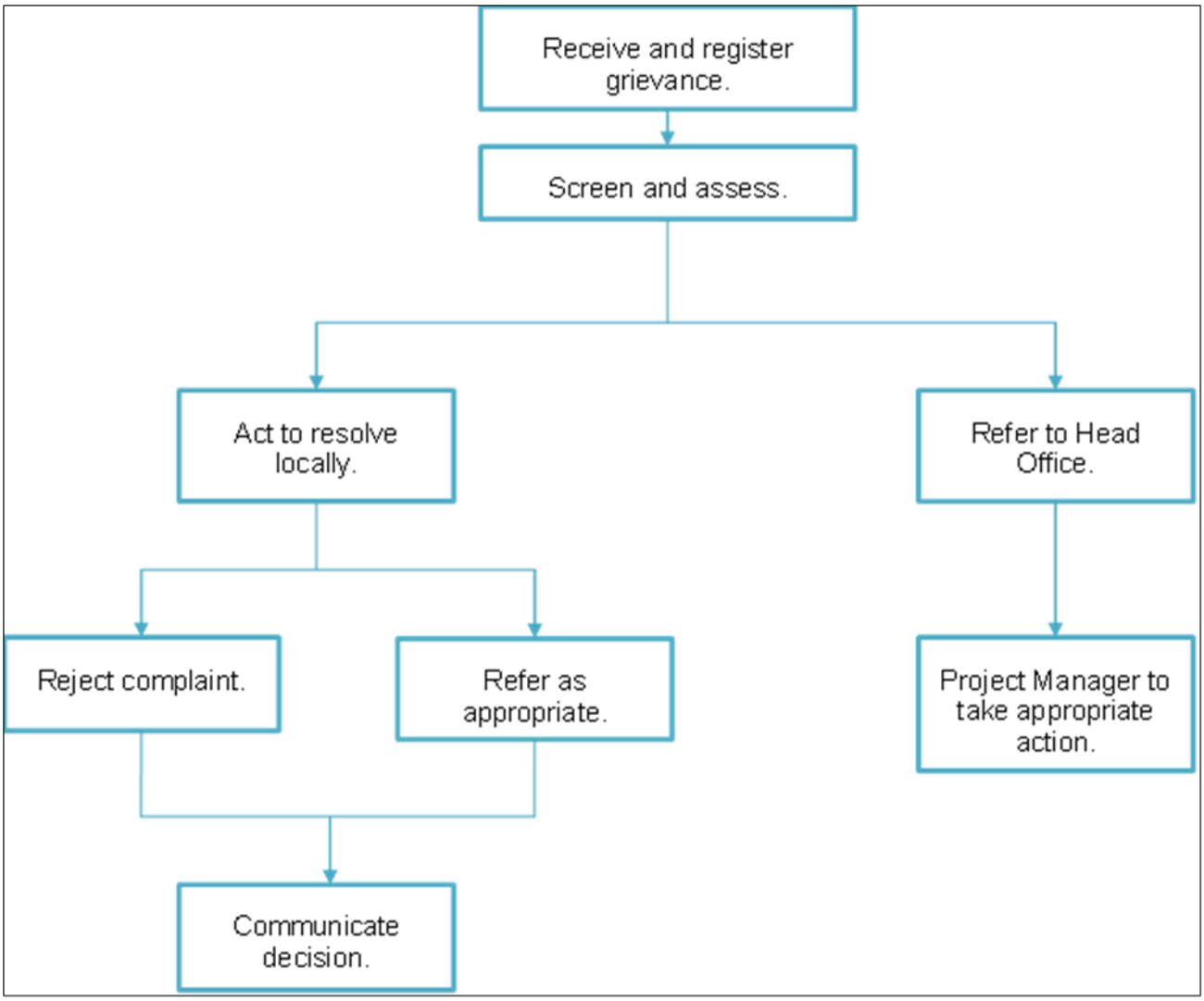


Figure 7: Grievance response procedure

12CONCLUSION

The preparation of this ESMP is based on the current information provided; any changes or deviations concerning the proposed pipeline route and /or the proposed ground-level reservoir site shall trigger changes to this ESMP. If all mitigation measures are implemented as outlined in the ESMP, it is anticipated that the consequences and/or probability of the predicted negative impacts will be managed/reduced.

Although the implementation of this ESMP requires a multitude of administrative tasks, NamWater should play a central role in the implementation as outlined in this report. NamWater should also ensure proper coordination with all parties involved in the project activities during all project phases. NamWater shall also ensure to avail of necessary resources (i.e., human, financial, etc.) and training to enable the full implementation of this ESMP. The implementation of this ESMP can be combined with NamWater's s environmental code of conduct. Monitoring of certain environmental parameters must be conducted regularly as outlined in this ESMP. Environmental biannual reports must be kept available for possible submissions to the MEFT and ensure the renewal of the project's ECC.

Upon approval by the MEFT, this ESMP should be used as an on-site reference document for the design, construction, operation, maintenance, and decommissioning phase of the Orab – Gibeon pipeline replacement. The ESMP documents are applicable for all project phases, thus a copy of this ESMP shall always be kept onsite. It is a legally binding document, thus, any deviation or transgression from this ESMP is punishable by law as per the Environmental Management Act 07 of 2007. Parties responsible for transgressing may be held responsible for any rehabilitation that may need to be undertaken.

13 ANNEXURES

Annexure A - Generic example of a method statement

Annexure B - Environmental compliance monitoring checklist

Annexure C: Essential Services Contacts

Annexure D: Fire response procedures

Annexure E: Incident / Accident Report form

Annexure F: Nam Water's environmental code of conduct

Annexure D: Grievances register form

Annexure H: Chance Finds Procedure (CFP) management guideline for Archaeology

13.1 ANNEXURE A - GENERIC EXAMPLE OF A METHOD STATEMENT

METHOD STATEMENT

Contractor: ..... Date: .....

What work is to be undertaken - brief description of the works)

Where are the works to be undertaken? (where possible, provide an annotated plan and a full description of the extent of works)

Start and end date of works for which the method statement is required.

Start Date	**End Date**

How are the works to be undertaken? provide as much detail as possible, including annotated sketches and plans where possible) *Note: please attach extra pages if more space is required

13.2 ANNEXURE B: ENVIRONMENTAL COMPLIANCE MONITORING CHECKLIST

The following checklist should be used during compliance monitoring.

PART 1: ADMINISTRATIVE INFORMATION

Project Title:			Date:
Project location:	Reporting period	Individual Preparing Checklist:	
Region:		Department:	
Scheme Superintendent:		Phone No.:	

PART 2: ENVIRONMENTAL ASPECTS

	ENVIRONMENTAL COMPLIANCE (AS PER ESMP REQUIREMENT?)		
ENVIRONMENTAL ASPECT/IMPACT	YES	NO	**Remarks** (specify the location, a good practice observed, causes of non-conformity, and proposed action)
Waste management			
Water quality testing			
Water balance check			

PART 3: RECOMMENDATION

FOR EACH ITEM CHECKED IN PART 2, DESCRIBE THE CORRESPONDING CONTROLS TO BE IMPLEMENTED TO REDUCE POTENTIAL ENVIRONMENTAL IMPACTS (e.g., spill prevention, erosion controls, air emission controls including dust suppression, selection of materials, etc.). Provide details of the activities and impacts for each box and the proposed mitigations. Include attachments where appropriate. Use the same number system for your input.

ECO: Signature: _____ Date: _____

Scheme Superintendent: Signature: _____Date: _____

13.3 ANNEXURE C: CONTACT DETAILS FOR EMERGENCY. ESSENTIAL SERVICES & POLICE STATIONS

Table 14: Contact Details for Emergency. Essential Services & Police Stations – Mariental

Town	Type of Service	Contact Number
Mariental	Police Service	+264 63 240666
	Fire brigade	+264 63 240347
	Electricity	+264 63 240347
	Water / Sewage	+264 63 240347
	Ambulance Service	+264 63 2423311
	Mariental State Hospital	+264 63 245 050

Table 15: Contact Details for Emergency. Essential Services & Police Stations - Gibeon

Town	Type of Service	Contact Number
Gibeon	Police	+264 63 251003
	Fire	-
	Electricity	+264 63 251014
	Water / Sewage	+264 63 251014
	Ambulance Service	+264 63 251026
	Clinic	+264 63 251026

Table 16: Other Relevant Contact Details

Institution	Name and Contact Details
Hardap Regional Health Directorate	**Director (Ms. Yvonne Stephanus)** Tel: +264 63 245 528/9 Cell: +264 81 124 38430 / +264 81 160 8828 Email: Yvonne.stephanus@mhss.gov.na
Control Social Worker - Hardap Region	Ms. C. Manghono Telephone: +264 81 243 0744
Senior Social Worker (Mariental office):	Ms. S. Muhinda Telephone:+264 81 338 8269
Community Liaison Officer – Hardap Regional Council	+264 63 245 800 +264 63 242 427

13.4 ANNEXURE D: FIRE RESPONSE PROCEDURES

Things you must-do if you discover a fire!!!

STEP 1

- Do not panic
- Press the nearest alarm button
- Rescue any person in immediate danger, if safe to do so

STEP 2

- If possible, commence fighting the fire
- Call fire brigade

STEP 3

- Leave the building by the nearest emergency exit.
- Ensure all other personnel are warned along the way.
- Do not stop to collect personal belongings.
- Do not use lifts, use stair ways.

STEP 4

- Report to the assembly point
- Do not return to the building until authorized to do so

13.5 ANNEXURE E: INCIDENT / ACCIDENT REPORT FORM

This form is to be completed in case of an environmental incident and shall be forwarded to the Project's RE during the construction phase and NamWater's Environment Section during the operation and maintenance phase.

Note: This form is not intended to replace other NamWater's internal reporting procedures.

Section 1. GENERAL DETAILS	
Date:	**Reported By:**
Time: **am / pm**	**Name:**
	Position:
	Company:
	Phone:

Section 2. RESPONSIBLE PARTIES

Name:	**Phone:**
Company Name:	**Email:**
Witness Details (if applicable)	
Name:	**Phone:**
Witness Statement Taken? ☐ **Yes** ☐ **No**	

Section 3. INCIDENT DETAILS

Type of Incident:	☐ Spill	☐ Cultural Heritage disturbance/damage
	☐ Waste/rubbish	☐ Chemicals/herbicide Use
	☐ Wildlife disturbance	☐ Water pollution/contamination
	☐ Vegetation disturbance/damage	☐ Nuisance (noise, air quality)
	☐ Acid Sulphate Soils disturbance	☐ Sexual Exploitation, Abuse, and Sexual Harassment
		☐ Other:

Incident Description
Immediate Response Actions Taken:

Section 4. CONTRIBUTING FACTORS AND PREVENTATIVE ACTIONS

(to be completed by Manager/Supervisor)

Cause, Circumstances, and Contributing Factors:	
Measures that were in place to prevent this type of incident:	
Measures to be implemented to prevent/minimize this type of incident from occurring again	
Manager / Supervisor General Comments	
Comments:	

Name:	**Position:**	
Company:	**Signature:**	**Date:**

Section 5. NAMWATER ENVIRONMENT OFFICE ONLY

Assessed Level of Potential or Actual Harm:	
Is an Investigation Required? ☐ Yes ☐ No	**Investigation Team:**
FOLLOW UP ACTION:	
COMMENTS	

Name:	**Position:**
Signature:	**Date:**

13.6 ANNEXURE F: NAMWATER ENVIRONMENTAL CODE OF CONDUCT

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.

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 drilling process.

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 drilling site. 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 Contractor 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 drilling site 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 FOREMAN, CONTRACTOR'S REPRESENTATIVE or EMPLOYER'S REPRESENTATIVE. 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 drilling areas at demarcated entrances.
2. Wear protective clothing and equipment as per signboards on site and according to instructions from your foreman.
3. Report to your CONTRACTOR'S REPRESENTATIVE if you see a stranger or unauthorised person in the drilling area.
4. Never enter any area that is out of bounds or that is demarcated as dangerous without permission of your CONTRACTOR'S REPRESENTATIVE.
5. Never climb over any fence or enter private property without permission of the landowner or your CONTRACTOR'S REPRESENTATIVE.
6. Do not remove any vehicle, machinery, equipment, or any other object from the drilling site without the permission of your CONTRACTOR'S REPRESENTATIVE.

7. Keep clear of blasting sites. Follow the instructions of your CONTRACTOR'S REPRESENTATIVE.
8. Never enter or work in the drilling area while under the influence of alcohol or other intoxicating substances.
9. Make your camp at a designated area. If possible, camp at already disturbed areas.
10. Campsites and work sites should not be on an archaeological site or sites of scenic or cultural interest. Camp sites and working sites must be clearly demarcated.
11. Keep drilling areas as small as possible.
12. All drilling areas and open trenches should be clearly demarcated.
13. All staff should know the emergency procedures in case of accidents.

Waste Disposal

14. 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.

15. 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.
16. Recycle drums, pallets and other containers.
17. Never bury or burn any waste on site, all waste is to be disposed in allocated refuse disposal containers, bins or bags.
18. Never overfill any waste container. Inform your CONTRACTOR'S REPRESENTATIVE if you notice a container that is nearly full.
19. Do not litter.
20. Do not bury litter or rubbish in the backfill trench.

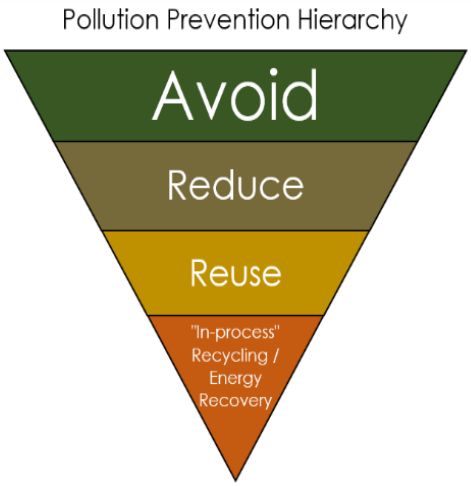
Plants and Animals

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 EMPLOYER'S REPRESENTATIVE 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 CONTRACTOR'S REPRESENTATIVE 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 FOREMAN 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 CONTRACTOR'S REPRESENTATIVE.
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 CONTRACTOR'S REPRESENTATIVE 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 CONTRACTOR'S REPRESENTATIVE 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. Stockpile the top 20 cm of topsoil in small heaps and protect from wind erosion.
43. Do not make any new roads or clear any vegetation unless instructed to do so by your CONTRACTOR'S REPRESENTATIVE.
44. Keep to established tracks and pathways.
45. 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 CONTRACTOR'S REPRESENTATIVE.

Working Hours

50. Inform local authorities when the drilling process will commence.
51. You may only work on weekends and after hours with the consent of the CONTRACTOR'S REPRESENTATIVE.

Archaeological and Cultural Objects

52. If you find any archaeological, cultural, historical or pre-historical object on the drilling site you must immediately notify your CONTRACTOR'S REPRESENTATIVE.
53. Never remove, destroy, or disturb any cultural, historical, or pre- historical object on site.

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

<u>Pre-Historical objects</u> include fossils and old bones, old human skeletal remains, pieces of pottery and old tools and implements.

For any enquiries, please call

Fillemon Aupokolo
Tell: 061-71 2095
Cell: 081 325 3301

OR

Jolanda Kamburona
Tell: 061-71 2105
Cell: 081 217 8116

13.7 ANNEXURE G: GRIEVANCES REGISTER FORM

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

13.8 ANNEXURE H: CHANCE FINDS PROCEDURE (CFP) MANAGEMENT GUIDELINE FOR ARCHAEOLOGY:

(Extracted from - Archaeological Guidelines for Exploration & Mining in the Namib Desert, Kinnanhan, 2012).

INTRODUCTION: Areas of proposed mining and related activity are subject to heritage survey and assessment at the planning stage. These surveys are based on surface indications alone, and it is therefore possible that sites or items of heritage significance will be found in the course of development work. The personnel and Contractor heritage induction process in intended to sensitize people so that they may recognize heritage "chance finds" in the course of their work. The procedure set out here covers the reporting and management of such finds.

SCOPE: The "chance finds" procedure covers the actions to be taken from the discovery of a heritage site or item to its investigation by a trained archaeologist or other appropriately qualified person.

INTENT: The "chance finds" procedure is intended to ensure compliance with the AMP, which is based on archaeological best practice, and the relevant provisions of the National Heritage Act (27 of 2004), especially Section 55 (4): "a person who discovers any archaeological … object … must as soon as practicable report the discovery to the Council." The procedure of reporting set out below must be observed so that heritage remains reported to the NHC are correctly identified in the field.

RESPONSIBILITIES:

Operator:	To exercise due caution if archaeological remains are found
Foreman:	To secure the site, and advise management timeously
Superintendent:	To determine safe working boundary and request inspection
Archaeologist:	To inspect, identify, advise management, and recover remains

PROCEDURE:

Action by person identifying archaeological or heritage material:

a) If operating machinery or equipment, stop work

b) Identify the site with flag tape

c) Determine GPS position if possible

d) Report findings to Foreman

Action by Foreman:

a) Report findings, site locations and actions taken to Superintendent

b) Cease any work in immediate vicinity

Action by Superintendent:

a) Visit site and determine whether work can proceed without damage to findings

b) Determine and mark exclusion boundary

c) Add site location and details to AMP GIS for field confirmation by archaeologist

Action by Archaeologist:

a) Inspect site and confirm addition to AMP GIS

b) Advise NHC and request written permission to remove findings from work area

c) Recover, package and label finds for transfer to National Museum

In the event of discovering human remains

- Actions as above
- Field inspection by archaeologist to confirm that remains are human
- Advise and liaise with NHC Guidelines
- Recovery of remains and removal to National Museum or National Forensic Laboratory, or as directed.