ENVIRONMENTAL IMPACT ASSESSMENT AND COMPILATION OF AN ENVIRONMENTAL MANAGEMENT PLAN FOR THE CONSTRUCTION, OPERATION, MAINTENANCE AND DECOMMISSIONING OF THE PROPOSED HENTIES BAY PIPELINE AND THE REPLACEMENT OF THE GROUND LEVEL RESERVOIR, HENTIES BAY, ERONGO REGION.

Proponent

Namibia Water Corporation Ltd
Private Bag 13389, Windhoek,
Tel: +264-6171 2093

NAMWATER
Namibia Water Corporation Ltd

atushe

ENVIRONMENTAL SCOPING REPORT

APRIL 2022

PREPARED BY:

Green Gain Consultants
+264 81 142 2927
info@greengain.com.na
https://www.greengain.com.na

DOCUMENT INFORMATION

Project:	Construction, operation, maintenance, and decommissioning of the proposed Henties Bay pipeline and the replacement of the Ground Level Reservoir, Henties Bay, Erongo Region.
Location:	Henties Bay, Erongo Region
Client:	Namibia Water Corporation Ltd Private Bag 13389, Windhoek, Tel: +264-6171 2093
EAP:	Green Gain Environmental Consultants cc Joseph Kondja Amushila Nangula Amutenya Amatsi
Report Type:	Draft-Scoping Report
ECC Application:	APP003544
Project Number:	C-SHEN208
Procurement No.	No: SC/RP/NW-14/2021
Period:	September 2021 – April 2022

TABLE OF CONTENTS

1. INTRODUCTION AND BACKGROUND 8
1.1 Introduction 8
1.2 Purpose of the report 8
2. TERMS OF REFERENCE 9
2.1 Scope of the study 9
2.2 EIA objectives 9
3. APPROACH AND METHODOLOGY 10
3.1 The EIA processes 10
3.2 Collection of baseline information 11
3.2.1 Site visits 11
3.2.2 Review of existing information 11
3.3 Public participation process 11
3.3.1 Stakeholders' consultation 11
3.3.2 I&APs invitation and consultation 12
3.3.3 Consultative meeting 13
3.3.4 Review of draft scoping report 14
3.3.5 Summary of issues from I&APs and stakeholders 14
4. LEGAL FRAMEWORK AND REQUIREMENTS 16
4.1 Environmental management requirements 16
4.2 Applicable legislations 17
5. DESCRIPTION OF THE HENTIES BAY WATER SUPPLY SCHEME 30
5.1 The existing water supply scheme 30
5.2 Existing infrastructure 31
5.2.1 Off-take at the Omdel collector 31
5.2.2 Pipeline 31
5.2.3 Bulk water storage facilities 33
5.3 Water sources and quality 35
5.4 Water distribution and balance analysis 36
5.4.1 Production losses 36
5.4.2 Distribution losses 37
5.5 Current operational concerns/ issues 37
5.6 The need and desirability of the new pipeline and the new ground level reservoir 38
6. PROPOSED DEVELOPMENT AND ALTERNATIVES 39
6.1 Replacement of existing bulk supply pipeline 39
6.1.1 Pipeline route 39
6.1.2 Above ground vs buried pipeline 40

6.1.3 Pipe material selection 40
6.1.4 Abandoning the existing pipeline or removing it 41
6.2 New ground level reservoir 42
6.2.1 Locality 42
6.2.2 Ground level reservoir design 45
6.3 The new Henties Bay supply scheme 45
6.4 Resource requirements 47
6.4.1 Project costs 47
6.4.2 Source of construction materials 47
6.4.3 Land requirements 47
6.4.4 Electricity consumption and requirements 47
6.4.5 Workforce requirement during construction 47
6.4.6 Workforce requirements during operation 48
7. DESCRIPTION OF THE RECEIVING ENVIRONMENT 49
7.1 Social Environment 49
7.1.1 About the town 49
7.1.2 Population demographics 50
7.1.3 Economic and social development 51
7.1.4 Water and sanitation 51
7.1.5 Archaeological and Heritage Context 51
7.2 Biophysical Environment 52
7.2.1 Climate 52
7.2.2 Topography 54
7.2.3 Soils 55
7.2.4 Geology 56
7.2.5 Hydrology 57
7.2.6 Landscapes 58
7.2.7 Local occurring flora and fauna 59
8. ANTICIPATED ENVIRONMENTAL IMPACTS 60
8.1 Impacts rating scales. 60
8.2 Anticipated impacts: planning and design phase 62
8.3 Anticipated negative impacts: construction phase. 65
8.4 Anticipated negative impacts: operation and maintenance phase. 74
8.5 Anticipated positive impacts. 77
8.6 Decommissioning phase 79
8.6.1 Decommissioning of the existing supply pipeline 79
8.6.2 Decommissioning the existing ground level reservoirs 82
9. CONCLUSION AND RECOMMENDATIONS 86

9.1 Conclusion 86
9.2 EAP recommendations 87
10. REFERENCES 88
11. APPENDICES 89
11.1 Appendix A: HWSS Sales figures 2016-2020 89
11.2 Appendix B: Water Consumption for Henties Bay town 89
11.3 Appendix C: Development Proposal for the HWSS 89
11.4 Appendix D: Proof of Consultations 89
11.5 Appendix E: Henties Bay Municipality Commitment Letter 89
11.6 Appendix F: EMP 89

LIST OF TABLES

Table 1 Summary of identified issues 14
Table 2: The listed project activities 16
Table 3: Applicable legislation 17
Table 4: Production losses 36
Table 5: Distribution losses 37
Table 6: Sufficiency of Scheme Components (Source: NamWater, 2016) 38
Table 7: Materials for the existing pipeline 41
Table 8: Statistics of the Arandis Constituency and Erongo Region (Namibia Statistics Agency, 2011) 50
Table 9: Impact rating scales 60
Table 10: Description of the significance of impacts 61
Table 11: Potential impacts of exhumation of the section of the existing AC pipeline 80
Table 12: Potential impacts of keeping the existing reservoir (if not used) 82
Table 13: Potential impacts of demolishing the existing reservoirs 84

LIST OF FIGURES

Figure 1: Namibia's EIA process 10
Figure 2: Copy of the Newspaper Advert (Namib Times) 12
Figure 3: View of the public meeting 13
Figure 4: Current HWSS layout (source: NamWater, 2016) 30
Figure 5: Facilities at the Off- take 31
Figure 6: One of the three boreholes not in use 31
Figure 7: Eastern part of Henties Bay townland 32
Figure 8: Location of the existing bulk storage facilities 33
Figure 9: Overview of the existing bulk water storage facilities 34
Figure 10: Proposed pipeline route and alternative sites for the new ground level reservoir 42
Figure 11: Preferred Scheme Option Schematic (Source: NamWater, 2016) 46
Figure 12: Henties Bay Location Map 49
Figure 13: Average Evaporation rate (Mendelsohn, *et al* 2002) 52
Figure 14: Average annual in Namibia 53
Figure 15: Elevation of Henties Bay town and surrounding 54
Figure 16: Local occurring soils 55
Figure 17: Geological map of Namibia (Source: Miller, R. McG, 2008) 56
Figure 18: Hydrography map of Namibia (Rivers, basins, pans, and lakes) (Source: Chivell EH & Crerar SE. 1992) 57
Figure 19: Location of the lichen field in relation to the proposed pipeline route and ground level reservoir site (Source: NACOMA, 2013). 58
Figure 20: Local occurring flora 59
Figure 21: Local fauna 59

LIST OF ACRONYMS

APA	Authorised Planning Authority
BID:	Background Information Document
CBD:	Central Business District
DEA:	Directorate of Environmental Affairs
DWA:	Department of Water Affairs
EAP:	Environmental Assessment Practitioner
ECC:	Environmental Clearance Certificate
EHP:	Environmental Health Practitioner
EIA:	Environmental Impact Assessments
EMA:	Environmental Management Act
EMP:	Environmental Management Plan
ERC:	Erongo Regional Council
GN:	Government Notice
HDPE	High-Density Polyethylene
HWSS:	Henties Bay Water Supply Scheme
I&APs:	Interested and Affected Parties
MAWLR:	Ministry of Agriculture, Water, and Land Reform
MEFT:	Ministry of Environment, Forestry, and Tourism
MoHSS:	Ministry of Health and Social Services
mPVC	Microcellular polyvinyl chloride
MSDS:	Material Safety Data Sheet
NHC:	National Heritage Council
NYS:	National Youth Service
OD	Occupational Diseases
PPE:	Personal Protective Equipment
RA:	Roads Authority
UNAM	University of Namibia
uPVC:	Unplasticized Polyvinyl Chloride
Erongo RED:	Erongo Regional Electricity Distributor

EXECUTIVE SUMMARY

The Namibia Water Corporation (NamWater) Ltd, hereinafter referred to as the proponent supplies water to the Henties Bay Water Supply Scheme (HWSS) with groundwater from the Omdel well field that is linked to the Omdel-Swakopmund Water Supply Scheme. Water is supplied through a 6550 m supply pipeline and bulk water storage infrastructure located in the town Central Business District (CBD).

Due to aging infrastructure and increased demand, NamWater has decided to upgrade the bulk water supply infrastructure of the HWSS. The class and size of the bulk water supply pipeline from the Omdel off-take limit the maximum capacity of the off-take to supply the amount of water required to meet the current and future demand. The age of the pipes is also an issue of concern as the oldest pipes are more than 50 years old and thus need to be replaced. Furthermore, the capacities of the ground and elevated storage facilities are also inadequate. Moreover, the ground level reservoirs, although still functioning, have been severely affected by the coastal environment resulting in the rusting of the reinforcing steel, which in turn has caused concrete spalling and exposure of rusted steel in places.

The proposed upgrading entails the replacement of the existing pipeline and the construction of a new ground level reservoir and associated infrastructure. The proposed new pipeline will increase the capacity required to respond to the current and future water demand and secure the supply of safe drinking water to Henties Bay. The existing pipeline will be replaced with a bigger pipeline (250 mm) while the new ground level reservoir with a capacity of 5000m^3 will be constructed to meet the future water demand including the 2 days NamWater storage norm.

The proposed activities will trigger certain activities listed under No. 8, (No. 8.5), No. 9 (9.4), and No. 10 (10.1) of Schedule 1 of the EIA Regulations (GN No. 30 of February 2012), therefore cannot be undertaken without an EIA being undertaken. Green Gain Consultants cc has been appointed as an independent Environmental Assessment Practitioner (EAP) by NamWater, to conduct an Environmental Impact Assessment (EIA) for the construction, operation, maintenance, and decommissioning of the Henties Bay pipeline and the replacement of the ground level reservoir.

The main objective of this EIA is to determine the potential environmental impacts emanating from the construction, operation, maintenance, and decommissioning of the proposed infrastructure. The EIA was conducted in a multidisciplinary approach and followed Namibia's Environmental Assessment process. Relevant environmental data have been sourced from primary and secondary sources such as personal observations during site visits as well as inputs from NamWater officials, stakeholders, and interested and affected parties (I&APs) as well as a review of relevant literature and legal instruments.

This report constitutes an Environmental Scoping report which provides information to enable the Department of Water Affairs (DWA) and the Directorate of Environmental Affairs (DEA) to make informed decisions about the project. Moreover, an Environmental Management Plan (EMP) has been prepared and it should be read in conjunction with this Scoping report. The EMP will be used as a mitigation tool and an onsite reference document during all phases of the proposed project (planning, construction, operations, and decommissioning).

1. INTRODUCTION AND BACKGROUND

1.1 Introduction

NamWater supplies water to Henties Bay town and surrounding through the HWSS with groundwater from the Omdel well field that is linked to the Omdel-Swakopmund Water Supply Scheme. Due to aging infrastructure and increased demand, NamWater has decided to upgrade the bulk water supply infrastructure for the HWSS. The proposed upgrading entails the replacement of the existing pipeline and the construction of a new ground level reservoir and associated infrastructure. The proposed new pipeline will increase the capacity required to respond to the current and future water demand and secure the supply of safe drinking water to Henties Bay.

The proposed activities cannot be undertaken without an approved EIA and EMP and an Environmental Clearance Certificate (ECC) being obtained. The EIA study identified potential environmental, safety, health, and socio-economic impacts associated with the construction, operation, maintenance, and decommissioning of the proposed pipeline and the new ground reservoir. Various mitigation measures were also proposed to avoid, mitigate, or lessen the identified negative impacts and enhance positive impacts.

1.2 Purpose of the report

This report provides details of the assessment process that was followed to address the key environmental issues and impacts associated with the development and to document issues and concerns of stakeholders and interested and affected parties (I&APs). Furthermore, it provides background motivation, details of the proposed project, describes the public participation process undertaken and provides a list of the applicable legislation.

The objective of this report, therefore, is to provide the competent authority and the regulatory authority with a comprehensive account of the process, findings, and input from I&APs, stakeholders, and commenting authorities who have participated in this EIA. Another objective is to provide details of the applicable legislative framework to ensure that the proposed work is undertaken in an environmentally responsible manner.

2. TERMS OF REFERENCE

The Terms of Reference (ToR) provided by the proponent requires the Environmental Assessment Practitioner (EAP) to carry out an EIA, prepare an EMP, and apply for an ECC for the construction, operation, maintenance, and decommissioning of the proposed Henties Bay pipeline and the replacement of the ground level reservoir in Henties Bay.

2.1 Scope of the study

The scope of the EIA is to determine the potential environmental impacts emanating from the construction, operation, and decommissioning of the proposed project. This EIA will ensure that the proposed Henties Bay pipeline and the replacement of the ground level reservoir in Henties Bay is environmentally sound and sustainable; that decision-making is improved through the appropriate analysis of actions and their likely environmental impacts; and that stakeholders/potentially affected people are properly consulted. The study was undertaken in two linked phases:

- Phase 1: Scoping study
- Phase 2: Environmental Management Plan

The proponent and the EAP have agreed that the information provided at the Scoping level is sufficient and no specialist studies are required after completion of the Scoping process. The EAP will then submit the Scoping report and the EMP to the DWA as the competent authority and to the DEA. The EAP will provide sufficient information to allow the DEA/MEFT to issue an ECC for the project in the absence of a fatal flaw.

2.2 EIA objectives

The aim of the study was to produce a Scoping Report and EMP report, which will provide sufficient information to enable the DEA at MEFT to make an informed decision about the project. The information submitted to the DEA should be sufficient to enable the DEA to issue ECC if no fatal flaw was identified. Thus, the specific objectives of this EIA are to:

- Identify potential impacts associated with the proposed activities.
- Consult potential I&APs and relevant stakeholders to solicit inputs.
- Produce a Scoping Report and EMP report, which will provide sufficient information to enable the competent authority DWA and DEA to make an informed decision about the project.

The report should 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. The EMP should indicate how mitigation measures would be implemented to avoid or minimize negative impacts and to enhance positive impacts. Monitoring and rehabilitation measures should be properly addressed.

3. APPROACH AND METHODOLOGY

3.1 The EIA processes.

This EIA study was conducted in line with the EIA Regulations (No. 30, February 2012). This is a draft Scoping report which will be shared with the registered I&APs and relevant stakeholders, after which it will be submitted to the competent authority, DWA, and the regulatory authority, DEA for record of decision.

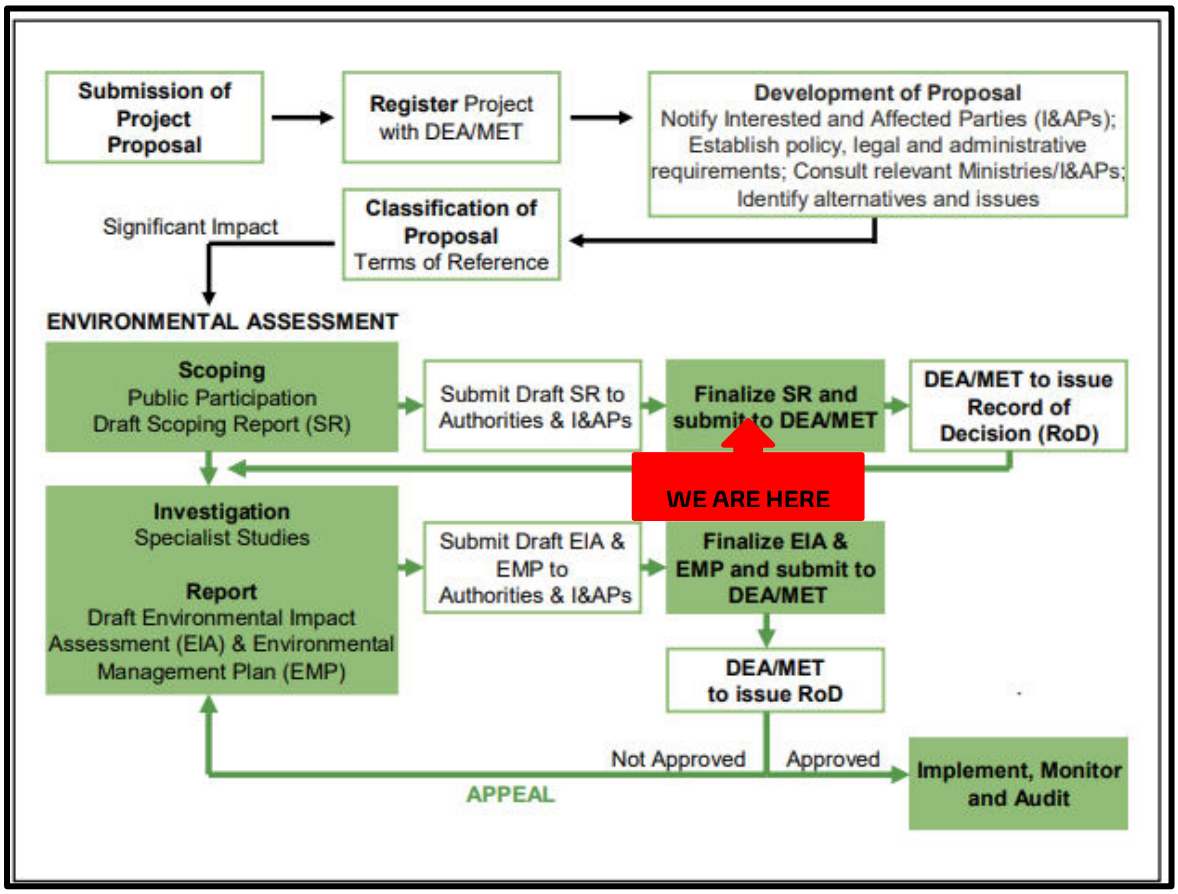


Figure 1: Namibia's EIA process

3.2 Collection of baseline information

Baseline information about the proposed development site, the receiving environment, and the proposed activities was obtained from personal observation, interviewing of the HWSS staff members, reviewing of existing secondary information, and contributions from stakeholders, and I&APs. The process that was followed is explained in detail here below.

3.2.1 Site visits

The initial site visit was conducted on 20 August 2021. During the site visit, the EAP was taken through the project site and was provided with the description and functioning of the existing infrastructure and water supply process. The EAP also collected baseline information on the biophysical settings of the site in terms of local occurring flora, fauna as well as adjacent land uses as outlined in Section 7 (7.2.6) of this report. Follow-up site visits were also conducted between September and October 2021 to collect more information.

3.2.2 Review of existing information

The Scoping process also benefited a great deal from existing relevant information. The following documents were reviewed during the scoping process.

- Preliminary Design Report. Henties Bay Pipeline and Ground Level Reservoir Replacement. NamWater- Nakale Angela S. August 2020
- Development Proposal on Bulk Water Supply to Henties Bay. NamWater – Planning Division. October 2016.
- Environmental Impact Assessment for the Proposed Desalination Project at Mile 6 near Swakopmund, Namibia, Final Scoping Report. CSIR. June 2009.
- In addition, several relevant legislations were reviewed, and their applicability to the proposed project is outlined in Section 5 of this document.

3.3 Public participation process

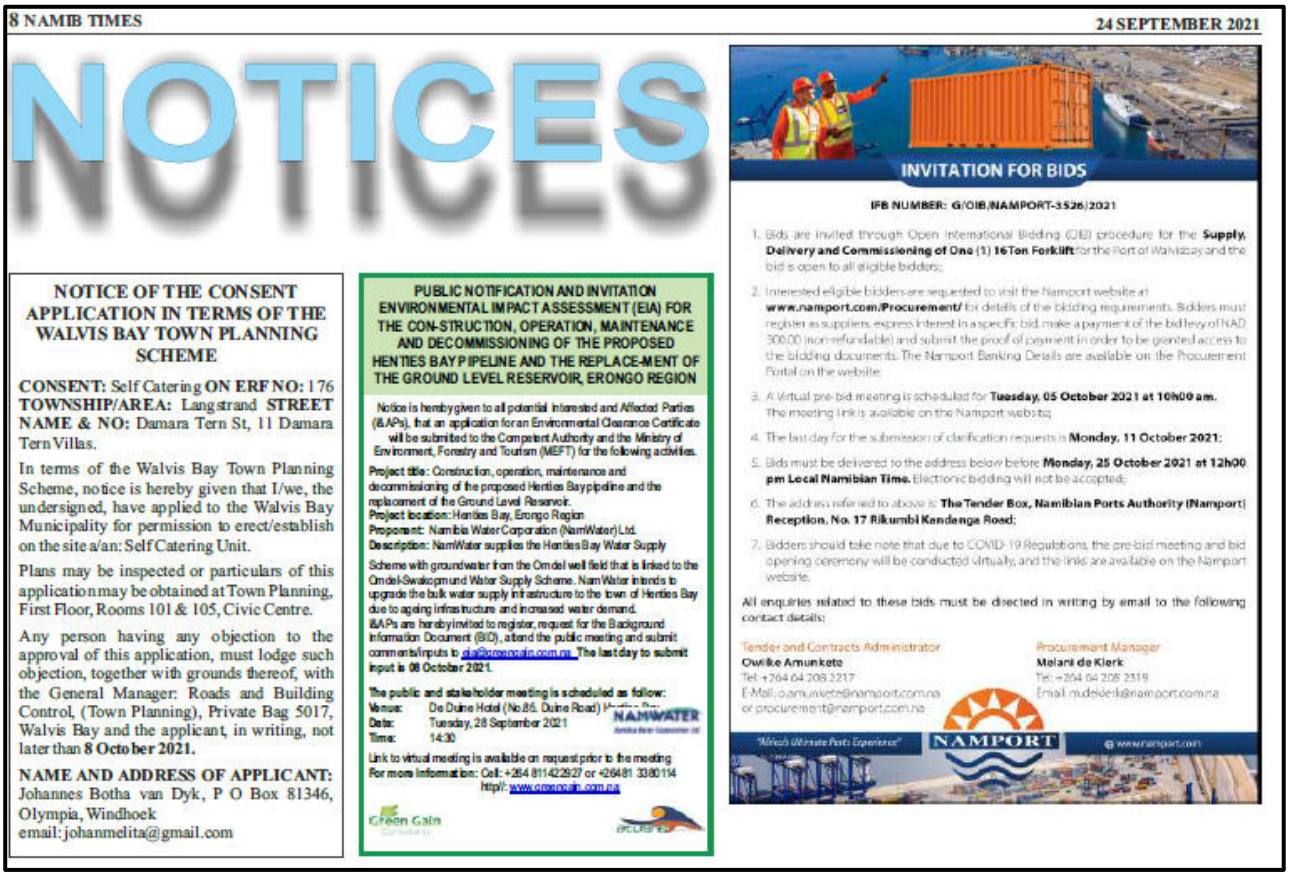
The study was subjected to a public participation process as defined in the Environmental Management Act 7 of 2007 and EIA Regulations of February 2012, this is summarized below:

3.3.1 Stakeholders' consultation

The project was formally introduced to key stakeholders such as the Henties Bay Municipality, Ministry of Agriculture, Water and Land Reform (MAWLR), Ministry of Health and Social Services (MoHSS), Erongo Regional Council (ERC), and government parastatals such as Erongo Regional Electricity Distributor (Erongo RED), National Youth Service (NYS) and Roads Authority (RA). These consultations aimed to ensure that all relevant stakeholders are aware of the development and to solicit their inputs.

3.3.2 I&APs invitation and consultation

The scoping process of the project was advertised in two local newspapers namely, New Era (on 16 and 23 September 2021) and Namib Times on (17 and 24 September 2021). Several public notices were also displayed at several public places around Henties Bay town and the NamWater Premises in Henties Bay. See Figure 2 below and Appendix C for the proof of consultations. The public advertisements provided brief information about the proposed project and an invitation to the public meeting.



8 NAMIB TIMES 24 SEPTEMBER 2021

NOTICES

NOTICE OF THE CONSENT APPLICATION IN TERMS OF THE WALVIS BAY TOWN PLANNING SCHEME

CONSENT: Self Catering **ON ERF NO:** 176 **TOWNSHIP/AREA:** Langstrand **STREET NAME & NO:** Damara Tern St, 11 Damara Tern Villas.

In terms of the Walvis Bay Town Planning Scheme, notice is hereby given that I/we, the undersigned, have applied to the Walvis Bay Municipality for permission to erect/establish on the site a/an: Self Catering Unit.

Plans may be inspected or particulars of this application may be obtained at Town Planning, First Floor, Rooms 101 & 105, Civic Centre.

Any person having any objection to the approval of this application, must lodge such objection, together with grounds thereof, with the General Manager: Roads and Building Control, (Town Planning), Private Bag 5017, Walvis Bay and the applicant, in writing, not later than **8 October 2021.**

NAME AND ADDRESS OF APPLICANT: Johannes Botha van Dyk, P O Box 81346, Olympia, Windhoek email: johanmelita@gmail.com

PUBLIC NOTIFICATION AND INVITATION ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR THE CON-STRUCTION, OPERATION, MAINTENANCE AND DECOMMISSIONING OF THE PROPOSED HENTIES BAY PIPELINE AND THE REPLACE-MENT OF THE GROUND LEVEL RESERVOIR, ERONGO REGION

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 Competent Authority and the Ministry of Environment, Forestry and Tourism (MEFT) for the following activities.

Project title: Construction, operation, maintenance and decommissioning of the proposed Henties Bay pipeline and the replacement of the Ground Level Reservoir.
Project location: Henties Bay, Erongo Region
Proponent: Namibia Water Corporation (NamWater) Ltd.
Description: NamWater supplies the Henties Bay Water Supply Scheme with groundwater from the Omdel well field that is linked to the Omdel-Swakopmund Water Supply Scheme. NamWater intends to upgrade the bulk water supply infrastructure to the town of Henties Bay due to ageing infrastructure and increased water demand.
I&APs are hereby invited to register, request for the Background Information Document (BID), attend the public meeting and submit comments/inputs to [illegible] The last day to submit input is 08 October 2021.

The public and stakeholder meeting is scheduled as follow:
Venue: De Duine Hotel (No.86, Duine Road)
Date: Tuesday, 28 September 2021
Time: 14:30

Link to virtual meeting is available on request prior to the meeting.
For more information: Call: +264 811422937 or +26481 3380114
http//: www.greengain.com.na

Green Gain

NAMWATER

INVITATION FOR BIDS

IFB NUMBER: G/OIB/NAMPORT-3526/2021

1. Bids are invited through Open International Bidding (OIB) procedure for the **Supply, Delivery and Commissioning of One (1) 16Ton Forklift** for the Port of Walvisbay and the bid is open to all eligible bidders;
2. Interested eligible bidders are requested to visit the Namport website at **www.namport.com/Procurement/** for details of the bidding requirements. Bidders must register as suppliers, express interest in a specific bid, make a payment of the bid levy of NAD 300.00 (non-refundable) and submit the proof of payment in order to be granted access to the bidding documents. The Namport Banking Details are available on the Procurement Portal on the website;
3. A Virtual pre-bid meeting is scheduled for **Tuesday, 05 October 2021 at 10h00 am.** The meeting link is available on the Namport website;
4. The last day for the submission of clarification requests is **Monday, 11 October 2021;**
5. Bids must be delivered to the address below before **Monday, 25 October 2021 at 12h00 pm Local Namibian Time.** Electronic bidding will not be accepted;
6. The address referred to above is: **The Tender Box, Namibian Ports Authority (Namport) Reception, No. 17 Rikumbi Kandenga Road;**
7. Bidders should take note that due to COVID-19 Regulations, the pre-bid meeting and bid opening ceremony will be conducted virtually, and the links are available on the Namport website.

All enquiries related to these bids must be directed in writing by email to the following contact details:

Tender and Contracts Administrator
Owilke Amunkete
Tel: +264 64 208 2217
E-Mail: o.amunkete@namport.com.na
or procurement@namport.com.na

Procurement Manager
Melani de Klerk
Tel: +264 64 208 2319
Email: mdeklerk@namport.com.na

"Africa's Ultimate Ports Experience" NAMPORT www.namport.com

Figure 2: Copy of the Newspaper Advert (Namib Times)

The background information document (BID) was compiled in English and distributed to all registered I&APs and stakeholders. The BID provided a brief introduction of the proposed project, the assessment process, and the public consultation process to be followed. The period for submission of comments started on 16 September to 08 October 2021. This allowed for 21 days comment period, in line with Section 3.4 (11) of the EIA Regulations of February 2012.

3.3.3 Consultative meeting

An inception meeting was held between the consultant team and the proponent team at the beginning of the EIA study. The purpose of the meeting was for the consultant team to gain an understanding of the proponent's requirements and expectations for this study.

Furthermore, a public meeting was held on 28 September 2021 at De Duine Hotel in Henties Bay. During the meeting, the EAP introduced the project to the attendees and allowed them to ask questions and make comments. The meeting was attended by representatives from the University of Namibia (UNAM)-Henties Bay campus, Henties Bay Municipality, and ERC as well as officials from NamWater-HWSS.

Figure 3: View of the public meeting

The proof of the above consultations is contained in Appendix D, of this report. These include.

- Copies of newspaper advertisements x 4
- Stakeholder database.
- Attendance registers for the public meeting.
- List of registered I&APs and stakeholders consulted.
- Issue Response report

3.3.4 Review of draft scoping report

This draft Scoping report will be submitted to registered I&APs as well as to relevant stakeholders for comments. Upon review by I&APs and stakeholders, the final Scoping report will be submitted to the competent authority and then, to the regulatory authority for record of decision.

3.3.5 Summary of issues from I&APs and stakeholders

Issues that were raised during the initial public participation process are listed in Table 1, below and were incorporated in the assessment.

Table 1 Summary of identified issues

Issue Raised by	Issues and concerns raised	Responses/Remarks
Henties Bay Municipality	Is it only one pipeline that will be supplying water to Henties Bay? One water supply pipeline will not be sufficient, as currently, the town is experiencing low water pressure. It will be best if the new reservoir is placed outside town and there will be three pipelines supplying water to town one for the northern area, one for central and one for the southern part of town.	If the new 5000m^3 water reservoir is to be in town at the current NamWater premises, then it will be only one NamWater pipeline to town. This new pipeline will however have increased capacity from the current 150 mm to 250 mm. If the ground level reservoir is to be located out of town, the option of having three or more pipelines to supply water from the reservoir to the town can be explored but it will be the Municipality's responsibility and not NamWater.
Henties Bay Municipality	The existing pipeline runs through the cemetery, the new pipeline should be diverted away from the cemetery	Noted
Henties Bay Municipality	The new C34 road was probably built on top of the old pipeline, will it not be a problem in future?	The new pipeline will be crossing the C34 under the existing culvert and approval will be obtained from RA.
ERC	Who is proposing the new reservoir to be placed in a town (at NamWater premises)?	The initial plan was to place the new reservoir outside town. This plan was communicated to the Henties Bay Municipality by NamWater. It appears that no consensus was reached between the two parties. Hence the initial ToR was that Green Gain should do an EIA for the new reservoir to be placed at the NamWater premises, Erf 419.

		The idea of having the reservoir outside town was revisited recently, after the engagement meeting between NamWater and the Henties Bay Municipality in 2021. As such, three locations (Alternative 1-3) will now be assessed for the possible location of a new ground level reservoir and a most suitable site will be recommended.
UNAM	The Scoping report should also address the socio-economic aspects such as job opportunities for the locals, HIV/AIDs, campsites during construction face.	Noted.
	UNAM campus always experience no water or low water pressure	It was explained that after water interruption in town, UNAM and the Seal Factory are always last to get water after re-connection due to their distance from town. If the new reservoir is be placed outside town, they could get dedicated water lines directly from the new reservoir

4. LEGAL FRAMEWORK AND REQUIREMENTS

4.1 Environmental management requirements

The proposed activities (construction, operation, maintenance, and decommissioning of the proposed Henties Bay pipeline and the replacement of the ground level reservoir), will trigger activities listed under the Environmental Management Act 7 of 2007 and the EIA Regulations (No. 03 of February 2012) as follows.

Table 2: The listed project activities

Proposed project activities	Activities triggered	
	Category	**Specific activity**
• **Construction of a new water pipeline**	No. 10 Infrastructure	10.1 The Construction of (a) oil, water, gas and petrochemical, and other bulk supply pipelines
• **Replacement of ground level reservoir**	No. 8 Water Resource Developments	8.5 Construction of dams, reservoirs, levees, and weirs.
• **Decommissioning of existing Asbestos pipes during the construction phase.**	No. 9 Hazardous substance treatment, handling, and storage	9.4 The storage and handling of dangerous goods, including petrol, diesel, liquid petroleum gas, or paraffin, in containers with a combined capacity of more than 30 cubic meters at any one location.

4.2 Applicable legislations

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

Table 3: Applicable legislation

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".	Through the implementation of the environmental management plan, the proponent shall be advocating for sound environmental management as set out in the constitution.

	Furthermore, Artic 95 (I) 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.	
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 Act 54 of 1956 (SA)	The Water Act 54 of 1956 and its requirements in Terms of Water Supplies for drinking water and Wastewater Treatment and Discharge. The Guidelines for the Evaluation of drinking-water quality for human consumption with regards to chemical, physical, and bacteriological quality requires that; water supplied for human consumption must comply with the officially approved guidelines for drinking-water quality. For practical reasons, the	The Department: Applied Scientific Services is responsible for conducting microbiological analysis while the physical/ aesthetic and chlorine analyses are done at HWSS on different frequency as follow.

	approved guidelines have been divided into three basic groups of determinants, namely: • Determinants with aesthetic implications: TABLE 1. • Inorganic determinants: TABLE 2. • Bacteriological determinants: TABLE 3. The water quality for human consumption is classified into three groups. The concentration of and limits for the aesthetic, physical and inorganic determinants define the group into which water will be classified. • Group A: Water with an excellent quality • Group B: Water with acceptable quality • Group C: Water with low health risk • Group D: Water with a high health risk, or water unsuitable for human consumption Water should ideally be of excellent quality (Group A) or acceptable quality (Group B), however, in practice, many of the determinants may fall outside the limits for these groups. If water is classified as having a low health risk (Group C), attention should be given to this problem, although the situation is not critical yet. If water is classified as having a higher health risk (Group D), urgent and immediate attention should be given to this matter. Since the limits are defined based on average lifelong consumption, short-term exposure to determinants exceeding their limits is not necessarily critical, but in the case of extremely toxic substances, such as cyanide, remedial measures should immediately be taken.	• Physical/aesthetic quality: **every two hours, daily** • Chlorine suspension: **every two hours, daily** • microbiological quality: **monthly** The Water Act 54 of 1956 has been replaced with a new Water Resource Management Act (WRMA) 11 of 2013 along with new water quality standards. The WRMA has not yet come into force legal. However, the DWA has started enforcing the water quality standards of 2013 and NamWater in endeavour to meet these standards.

	The overall quality group into which water is classified is determined by the determinant that complies the least with the guidelines for the quality of drinking water. Moreover, the recommended frequency for bacteriological analysis of drinking water is as follows. All applications in terms of Section 21(5) and 22(2), for compliance with the requirements of Section 21(1) and 21(2) of the Water Act (Act 54 of 1956) that purified water shall comply with General Standard as laid out in Government Gazette Regulation R553 of 5 April 1962.	
Water Resources Management Act 11 of 2013.	To provide for the management, protection, development, use, and conservation of water resources; to provide for the regulation and monitoring of water services and to provide for incidental matters. NB!! This Act has been passed by Parliament, but it has not yet been brought into force. It will come into force on a date set by the Minister in the Government Gazette. The Regulations of the WRMA also outlined the water quality guidelines and standards for potable water specified in Table 1 to Table 3. The Regulations also specified the frequency of microbiological monitoring for bulk water supply: Table 4.	Although the WRMA has not yet been Gazetted, the NamWater: Department of Applied Scientific Services which is responsible for water quality testing has started applying the new water quality guidelines and standards in 2019.

<table>
<tr>
<td></td>
<td>
<table>
<tr><th>SIZE OF POPULATION SERVED</th><th>Turbidity 95%</th><th>MINIMUM FREQUENCY OF SAMPLING</th></tr>
<tr><td>>250 000</td><td>< 0.5 NTU</td><td>Thrice weekly ***</td></tr>
<tr><td>100 001 – 250 000</td><td>< 1.0 NTU</td><td>Twice weekly</td></tr>
<tr><td>50 001 – 100 000</td><td>< 1.0 NTU</td><td>Once weekly</td></tr>
<tr><td>10 001 – 50 000</td><td>< 1.0 NTU</td><td>Three times every month</td></tr>
<tr><td>< 10 000 reticulated</td><td>< 1.0 NTU</td><td>Once very month*</td></tr>
<tr><td>< 10 000 non-reticulated</td><td>1 - 2 NTU</td><td>Once every month*</td></tr>
</table>
</td>
<td></td>
</tr>
<tr>
<td>Namibia Water Corporation Act 12 of 1997</td>
<td>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</td>
<td>In providing for the planning & designing, construction, operation, maintenance, and decommissioning of the proposed Henties Bay pipeline and the replacement of the ground level reservoir, the NamWater is carrying out its functions as mandated by the Act.</td>
</tr>
</table>

	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. (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.	
Soil conservation Act 76 of 1969	The objectives of the Soil Conservation Act 76, 1969 are to make provision for the combating and prevention of soil erosion, and the conservation, protection, and improvement of the soil, the vegetation, and the sources and resources of the water supplies. Part II deals with soil conservation works and it further states that in section 4(1). The Minister may by means of a direct order the owner of land to construct the soil conservation works referred to in such direction either on land belonging to such owner or on land belonging to another person, in such manner and within such period as may be mentioned in such direction, if the Minister is of the opinion that the construction of such soil conservation works is necessary to achieve any object of this	The NamWater Design team has indicated that before the construction of the ground level reservoir a geotechnical investigation will be carried out to determine the engineering properties of the soil(s) and/or rock(s) underlying the site, including the identification of potential problem soils and the presence of an underground water table.

	Act in respect of the land belonging to such owner.	
Hazardous Substance Ordinance 14 of 1974	This Ordinance provides for the control of toxic substances and is thus also relevant for pollution control. It covers the manufacturing, sale, use, disposal, dumping, importing, and exporting of hazardous waste. Of relevance to the proposed project is the use of Chlorine and asbestos which may be classified as dangerous goods.	Removal of asbestos pipes should be handled by a company authorized by MoHSS. Chlorine and other chemicals must be handled by the respective Material Safety Data Sheet (MSDS) from suppliers.
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.	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).

	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. 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.	

Asbestos Regulations: Schedule 1 (2) of Labour Act, 2007 (No. 11 of 2007, International Labour Organization Convention No. 162)	To comply with governmental requirements and minimize employee exposure, controls are necessary wherever there is a potential for exposure to airborne fibers.	All AC materials should be handled by the registered company and in accordance with the Asbestos Regulations.
Public Health and Environmental Act 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: **a)** any dwelling or premises which is or are of such construction as to be injurious or dangerous to health or which is or are liable to favour the spread of any infectious disease. **b)** 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. **c)** any area of land kept or permitted to remain in such a state as to be offensive, or liable to cause any infectious, communicable, or preventable disease or injury or danger to health; or **d)** Any other condition that is offensive, injurious, or dangerous to health. Furthermore, in terms of Section 8 of the Public Health Proclamation 16 of 1936, where a local authority is of the opinion that a nuisance is seriously offensive or a serious menace to the health, it may serve a notice on the owner or	Nuisance such as dust, noise, bad odors, etc. should be controlled during all project phases.

	occupant of the nuisance to immediately remove the nuisance. Failure to abide by this provision is an offense.	
Atmospheric Pollution Prevention Ordinance No. 11 of 1976	This Ordinance generally provides for the prevention of the pollution of the atmosphere and matters incidental thereto. The Ordinance deals with administrative appointments and their functions; the control of noxious or offensive gases; atmospheric pollution by smoke, dust control, motor vehicle emissions; and general provisions. Part IV of this ordinance deals with dust control. The Ordinance is clear in requiring that any person carrying out an industrial process which is liable to cause a nuisance to persons residing in the vicinity or to cause dust pollution to the atmosphere, shall take the prescribed steps or, where no steps have been prescribed, to adopt the best practicable means for preventing such dust from becoming dispersed and causing a nuisance. Of applicability to the envisaged project, is dust generated by vehicles or equipment as well as dust generated during constructions. The risk of dust generation is high at the envisaged site. This deals with air pollution as it affects occupational health and safety, and no consideration is given to the natural environment.	Air pollution during operation could occur during the construction phase. It is the responsibility of NamWater to control excessive air pollution and comply with the ordinance.
Pollution Control and Waste Management Policy, 2003	The bill provides a framework for a multitude of administrations on pollution control and waste management in the country. Each authority identified by the bill shall play its respective role.	All waste management activities generated by the HWSS activities are the responsibility of NamWater.
Basel and Rotterdam Convention, Framework Convention on Climate Change	Agreed to ensure environmentally sound management of hazardous waste and other wastes through the reduction of	Asbestos should be handled by a recognized and authorized company.

	their movements, to reduce their impacts on human health and the environment. The Basel Convention makes specific reference to control of special waste: sharps, pathological infectious waste, hazardous chemical waste, and pharmaceutical waste and includes the following waste categories: • Clinical wastes from hospitals, health centres, and clinics. • Wastes from the production and preparation of pharmaceutical products. • Pharmaceutical waste. • Waste from the production, formulation, and use of biocides and Phyto-pharmaceuticals. Namibia has accepted the principle that the only legitimate transboundary shipments of hazardous waste are exported, where the country lacks the facilities or expertise to dispose of the waste categories. This applies to the transportation of radioactive waste from Namibia to South Africa. Because suitable facilities are not available in Namibia, provided that the radioactive waste is labelled, temporarily stored, and transported according to the United Nations recommended standards.	Any item labelled as radioactive should not be dumped at the local dumping site but should be transported to South Africa upon receipt of a transport permit from the MoHSS.
Stockholm Convention on Persistent Organic Pollutants	Emphasizes the restriction and elimination of persistent organic pollutants especially the disposal of industrial and medical chemicals. It also provides information for future establishments to re-use, reduce and recycle waste with	NamWater should register all products which are labelled as POP and forward such details to the Solid Waste Management Unit of the MEFT.

	environmentally friendly technologies e.g., autoclaving. It was adopted in 2001 and entered into force on May 17, 2004.	
Nature Conservation Ordinance 14 of 1975 and its amendments	The Nature Conservation Ordinance Section 14 protects and preserves wild animal life, fisheries, wild plant life and objects of geological, archaeological, historical, and other scientific interest and for the benefit and enjoyment of the inhabitants of Namibia.	Ensure protection and preservation of natural resources in line with the Ordinance.
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.
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.
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.
Roads Ordinance 17 of 1972 and its amendments	• Section 36.1 regulates rails, tracks, bridges, wires, cables, subways, or culverts across or under proclaimed roads • Section 37.1 deals with Infringements and obstructions on and interference with proclaimed roads.	Adhere to all applicable provisions of the Roads Ordinance. Written permission of the Roads Legislation Compliance Committee of the RA is required before the construction of the pipeline under the C34·road.

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).	Town Planning Procedures will be applied for the proposed subdivision of Henties Bay Town Land No.133 Since Henties Bay Municipality is not yet an approved APA, approval should be obtained from the Urban and Regional Planning Board
Henties Bay Town Planning Scheme	Identifies different land use categories, zoning, uses, and consent use.	Consent has already been obtained from Henties Bay Municipality with regard to the proposed new pipeline route and the site for the new ground level reservoir. The portion to be created for the new ground level reservoir should be zoned "Parastatals" to enable compliance with the Town Planning Scheme. Consent should be obtained from Henties Bay Municipality with regards to the portion of the pipeline to be abandoned in the ground.
Dorob National Park Rules and Regulations	The Dorob National Park was declared in Government Notice No. 266 of 1 December 2010 and specific regulations have been established for Dorob National Park under the Nature Conservation Ordinance. Hence, some activities in the Dorob National Park are allowed, while others are not as stipulated on the Parks Rules and Regulations.	All activities to be undertaken in line with the Dorob National Park Rules and Regulations.

5. DESCRIPTION OF THE HENTIES BAY WATER SUPPLY SCHEME

5.1 The existing water supply scheme

The schematic layout of the scheme is indicated in Figure 4. There are 8 Omdel boreholes situated on the northern bank of the Omaruru River. These boreholes pump water into the lower section of the Omdel West collector pipeline to which the Henties Bay pipeline is connected at a pressure-reducing off-take. The Henties Bay pipeline then crosses the Omaruru River and joins the original Henties Bay pipeline (to which a non-functional borehole connects) to supply water to the two-ground level water reservoirs in Henties Bay located in Henties Bay town CBD at the following coordinates *-22.1151180" S; 14.2813920" E*. The incoming water is chlorinated with a 70 kg gas cylinder at a dosage rate of 0.5 g/m^3 before being pumped into an elevated reservoir for distribution to the town's reticulation system (NamWater, 2016).

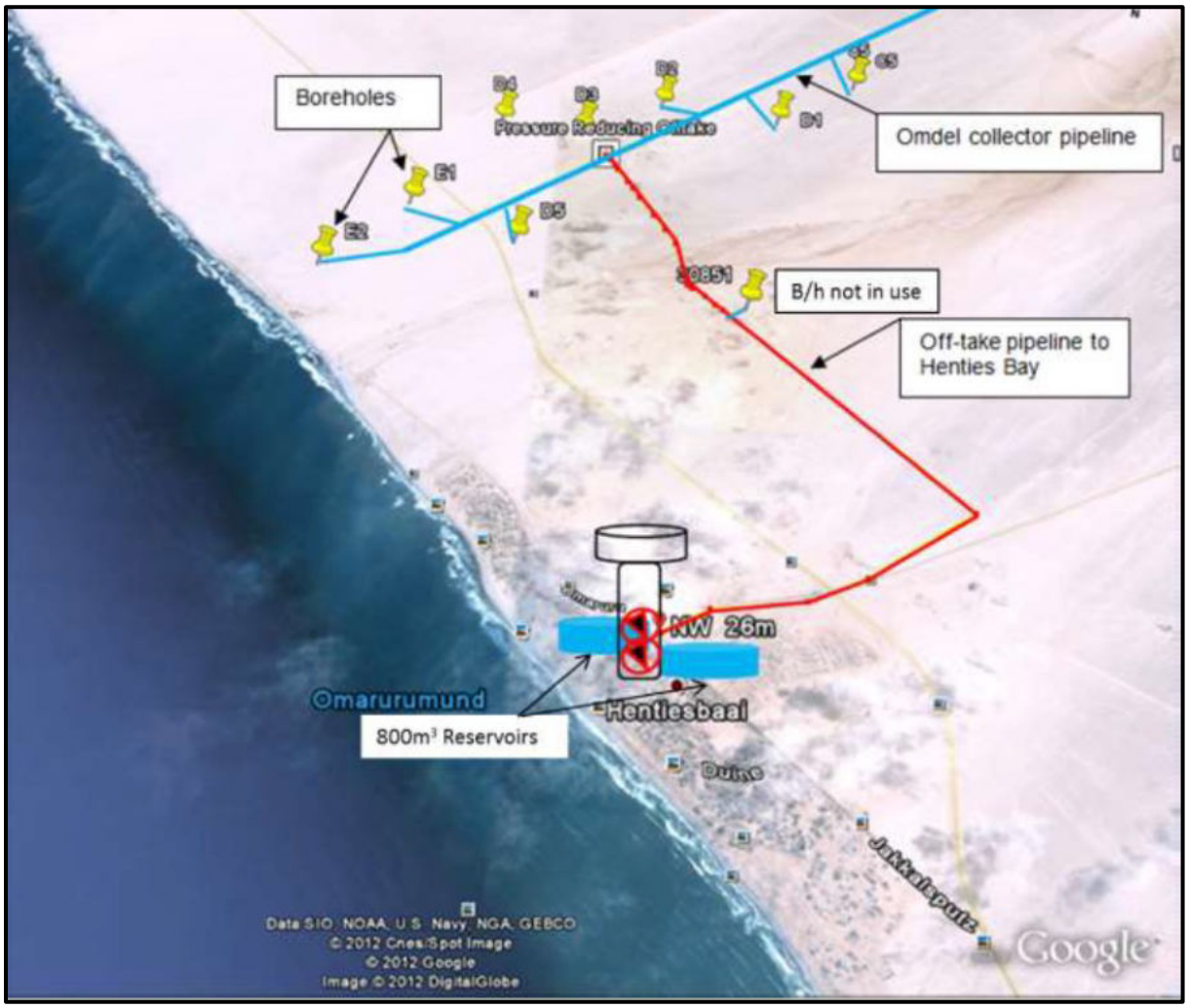


Figure 4: Current HWSS layout (source: NamWater, 2016)

5.2 Existing infrastructure

5.2.1 Off-take at the Omdel collector

The pressure reducing off-take on the Omdel West collector pipeline consists of two electrically actuated valves housed in a control room. These valves control the outlet pressure and respond to the ground level reservoir in Henties Bay.

Figure 5: Facilities at the Off- take

5.2.2 Pipeline

The existing pipeline (as shown in Figure 4) covers a total length of 6.55 km and is connected at an off-take (Figure 5) to the Omdel West Collector crossing over the Omaruru River and it then stretches through the NYS Centre before it crosses over the main road (C34) straight to the bulk water storage infrastructure in the town canter. Initially, the pipeline was fed by three additional boreholes located next to the NYS Centre, which have since dried up and are currently not in use (Figure 6).

Figure 6: One of the three boreholes not in use

According to NamWater (2020), the existing pipeline consists of a 1.335 km (160 mm diameter) Class 6 Unplasticized Polyvinyl Chloride (uPVC), 0.76 km (150 mm diameter) steel, and 0.41 km (160 mm diameter) Class 6 uPVC pipeline constructed in 1984. The last section comprises a 4.04 km (150 mm diameter) Class C 90 m working pressure Asbestos Cement (AC) pipeline, constructed in 1968.

As shown in Figure 7 below, the section of the existing pipeline from the old C34 road to town passes through the existing cemetery and encroached boundaries of eight (8) private properties in Henties Bay proper.

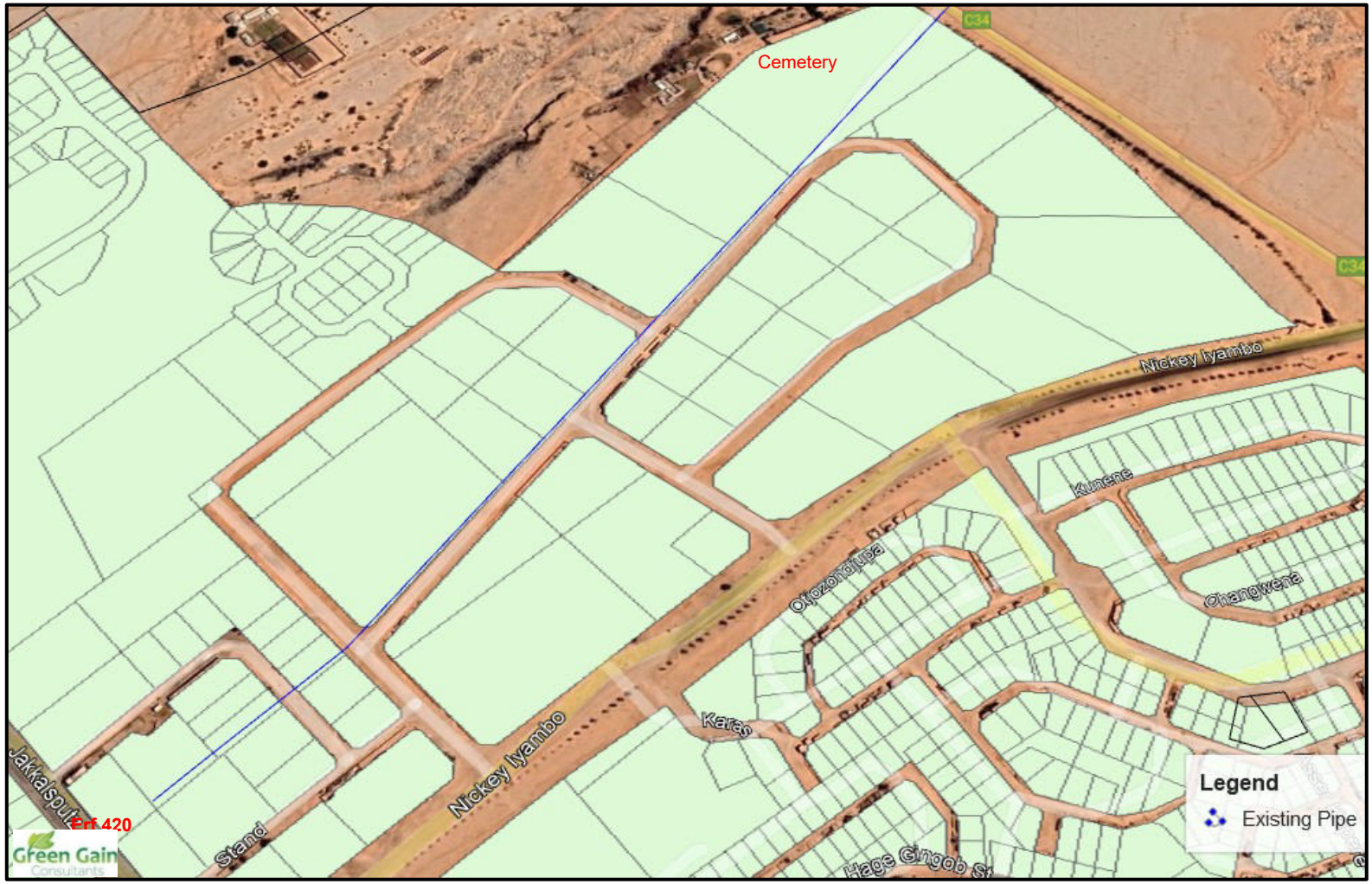


Figure 7: Eastern part of Henties Bay townland

5.2.3 Bulk water storage facilities

The existing bulk water storage facilities are located in the town's CBD at Erf 420 in Jakkalsputz Road adjacent to the vacant Erf 419 which also belongs to NamWater (Figure 8).

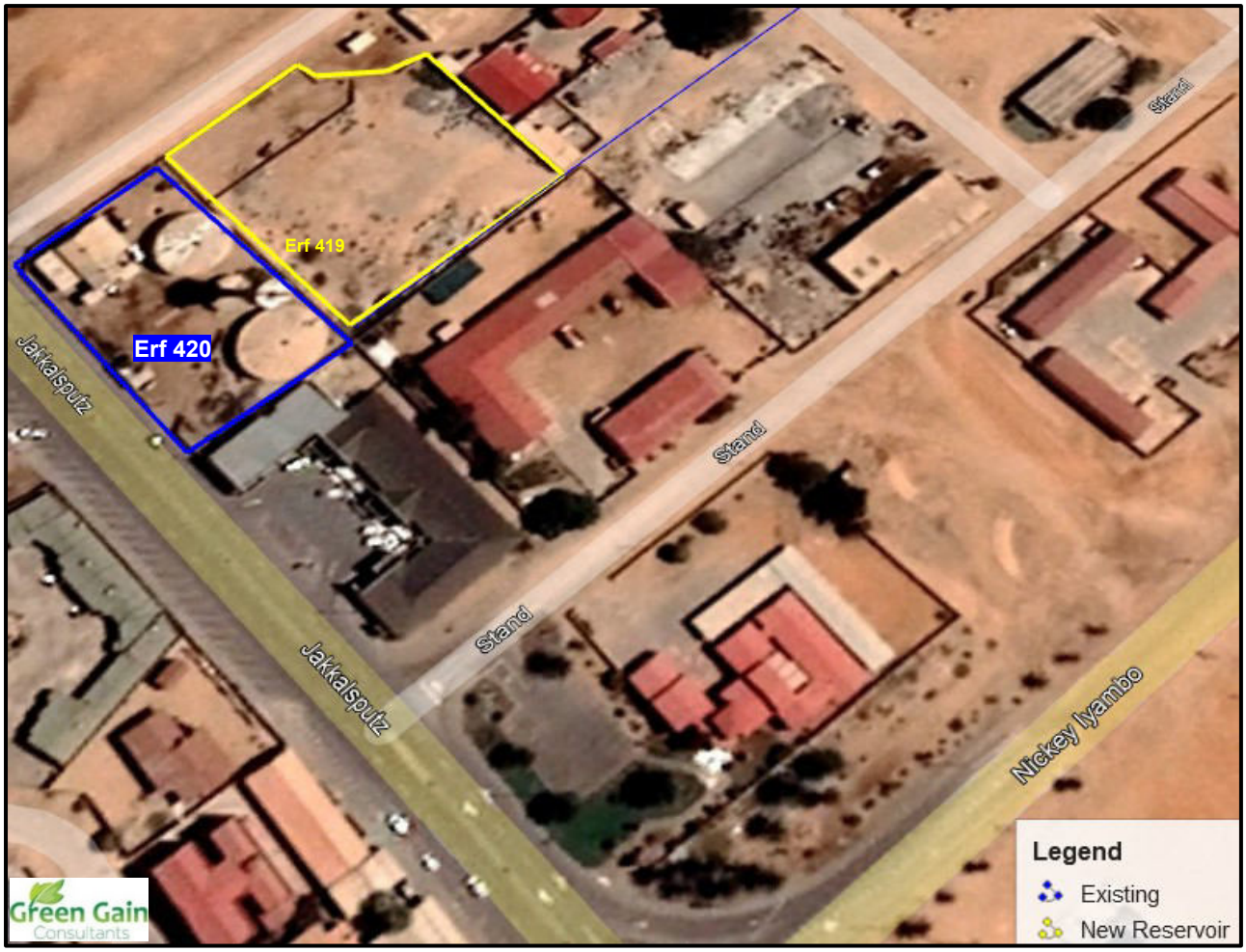


Figure 8: Location of the existing bulk storage facilities

Figure 9 below depicts the existing bulk water storage infrastructure which includes the two-800 m^3 ground level reservoirs and a 22 m high elevated concrete tower with a capacity of 187 m^3. On this premise (Erf 420) there is also a maintenance workshop and site office. Erf 419 located next to Erf 420 is currently vacant and used as a storage yard. Both properties belong to NamWater and are enclosed in the boundary wall. At the base of the tower, there are three booster pumps that reticulate water to the town distribution network.

Figure 9: Overview of the existing bulk water storage facilities

.

5.3 Water sources and quality

A total of 1.45 Mm^3/a is supplied from the 8 boreholes which pump into the lower section of the Omdel West collector pipeline. According to NamWater's s Development Proposal on Henties Bay of 2016, these boreholes are deemed to have an adequate supply for the foreseeable future.

To ensure the quality of water supplied to the town, water samples are collected twice a year from all the boreholes for chemical analysis. The free chlorine content of the product water is measured daily by NamWater personnel on-site.

The quality of water is acceptable as stipulated in the Water Resources Management Act (2013). According to MAWLR's Guidelines for drinking water for human consumption, the quality of water supplied by the HWSS can be classified under Group A (good quality).

5.4 Water distribution and balance analysis

Water from the off-take is measured using an 80 mm water meter and distributed to three cost centres namely Ilofa campsite, NYS centre, and Henties Bay Municipality. The water sold to the Ilofa campsite, and the NYS centre is measured by individual water meters connected at each off-take pipeline while the water sold to the Henties Bay Municipality is measured by two 150 mm meters on the outlet of the tower. The water consumed at the NamWater premises is also measured by a 20 mm Kent VKF 921 water meter, comparisons can hence be made between the water produced and the water sold to establish a water balance for the HWSS.

5.4.1 Production losses

In terms of the HWSS, the production losses are the amount of water loss between the off-take meter and distribution meter. These losses can be attributed mainly to leakages from the pipeline and reservoir walls or as a result of overflows.

Table 4: Production losses

Date	Reading at Offtake (M^3)	Total supply for Henties Bay [1] M^3	Difference M^3	**Production losses %**
Nov-20	51,864.00	51,118.00	746.00	**1.44**
Dec-20	65,905.00	46,273.00	19,632.00	**29.79**
Jan-21	61,773.00	73,312.00	-11,539.00	**-18.68**
Feb-21	52,255.00	51,766.00	489.00	**0.94**
Mar-21	56,652.00	50,774.00	5,878.00	**10.38**
Apr-21	56,368.00	54,381.00	1,987.00	**3.53**
May-21	54,833.00	57,743.00	-2,910.00	**-5.31**
Jun-21	50,409.00	51,998.00	-1,589.00	**-3.15**
Jul-21	52,005.00	44,412.00	7,593.00	**14.60**
Aug-21	55,473.00	59,776.00	-4,303.00	**-7.76**
Sep-21	52,247.00	50,426.00	1,821.00	**3.49**

[1] Total readings from the three meters 1. Henties Bay Municipality, 2. Ilofa Campsite, 3. National Youth Council

5.4.2 Distribution losses

Distribution loss is the amount of water lost during the distribution or supply process. In another term, it is the amount of water loss between the distribution meter and the sales meter.

The comparison between the amount of water sold by NamWater to the Henties Bay Municipality and the amount of water sold by the Henties Bay Municipality to its residents for the period 2018/2019(July 2018 to June 2019) to 2019/2020 (July 2019 to June 2020) is presented in the table below.

Table 5: Distribution losses

Categories	2018/2019	2019/2020
Total supply for Henties Bay	582,001.00	568,088.00
Total Sales by Henties Bay Municipality	381,783.00	387,500.00
Distribution loss	200,218.00	180,588.00
Distribution Losses %	34.40	31.79

The table above indicates the annual distribution losses of 34.40 % for the period 2018/2019 and 31.79% for 2019/2020. The Henties Bay Municipality could not provide an explanation for these rather very high and unusual distribution losses.

5.5 Current operational concerns/ issues

Interviews with the Scheme Operator and key personnel (Water Artisan – Henties Bay Municipality) in town revealed the major challenge of the water supply to the town:

- The existing NamWater tower discharging into the Henties Bay reticulation pipeline poses a bottleneck on the water supply. NamWater pumps water into the tower from which it gravitates via the sales meters into the reticulation. The NamWater booster pumps have enough capacity to meet the present average day demand in the peak month of 90 m^3/h with a corresponding peak day of 150 m^3/h. The NamWater booster pumps are set to the water level in the Tower, and due to the slow discharge rate from the Tower, the pumps sets are not fully utilized since they only run when the water level reaches the determined low level.
- During the peak month the town reticulation is suppressing demand. The challenge is that the gravity flow from the tower does not have enough pressure head to maintain pressure in the ever-increasing reticulation, let alone meet the instantaneous peak demand. Historical records indicate that the outlet flow from the tower is limited to a maximum of 150 m^3/h.

5.6 The need and desirability of the new pipeline and the new ground level reservoir

The sufficiency of scheme components was analyzed in the Development Proposal by NamWater in 2016. The summary of results is presented in Table 6 below.

Table 6: Sufficiency of Scheme Components (Source: NamWater, 2016)

Scheme Component	Capacity FY2016	Required FY2016	Required FY2033	Surplus FY2016	Surplus FY2033
Boreholes (Rec. Yield) (m^3/h)	289	114	188	175	101
Borehole Pumps (m^3/h)	247	114	201	133	46
Pipeline (m^3/day)	1,730	1,940	3,760	-210	-2030
Chlorination (m^3/h)	150	114	188	36	-38
Elevated storage (m^3)	187	1,089	1,808	-902	-1621
Ground Storage (m^3)	1,786	2,717	5,000 (4,534)	-931	-3,214
Booster pumps (m^3/h)	300	326	483	-26	-183

In 2016, the average water demand for the Henties Bay town was estimated at 114 m^3/h in peak months. This translates to a corresponding future average day demand in the peak month of 212 m^3/h considering a 3% growth rate and 1.58 peak factor (included in the 114m^3/h) and 15% losses. At the time that the planning report was prepared, the 2-day storage was 4 760 m^3 (based on 188m^3/h peak demand average (119m^3/h at 1.58 peak factor)) which is approximately 5 000 m^3. As it can be seen in Table 6 above, the existing storage facilities are indeed inadequate.

Based on the future demand estimates, the bulk water supply pipeline from the Omdel off-take to town is not adequate as the pipeline size and class limits the maximum capacity of the off-take. Furthermore, the age of the pipes is an issue of concern as the oldest pipes are 53 years old and thus need to be replaced.

The capacity of the existing storage reservoirs cannot meet the 2-day storage requirement as per NamWater norm. The reservoirs, although functioning, have been severely affected by the coastal environment resulting in the rusting of the reinforcing steel, which in turn has caused concrete spalling and exposure of rusted steel in places. Moreover, the elevated storage capacity is also inadequate.

Therefore, the replacement of the existing pipeline with a bigger pipeline (250 mm) and the construction of a new ground level reservoir with a capacity of 5 000m^3 is needed to meet the future water demand in Henties Bay.

6. PROPOSED DEVELOPMENT AND ALTERNATIVES

The proposed project entails the replacement of the existing pipeline and the construction of a new ground level reservoir and associated infrastructure. The development proposal addresses the components that have shortcomings as described in Section 5.5 and Section 5.6 of this report, the need and desirability of the project, and is also used to assess the different options to determine the most suitable bulk water supply scheme.

According to the NamWater Development Proposal for HWSS of 2016, various proposals of new reservoir sites and pipeline capacity and size options were presented and discussed with Henties Bay Municipality.

6.1 Replacement of existing bulk supply pipeline

The new supply pipeline from Omdel well field to the new ground level reservoir will take off from the same point as the existing pipeline on the Omdel West collector pipeline. Once the new pipeline has been commissioned, the old pipeline will be decommissioned, a switchover will also be done without causing any interruption of water supply. Pipeline alternatives options that were analyzed are as follows:

- Pipeline route.
- Above ground vs. buried pipeline.
- Pipe material options; and
- Leaving the decommissioned pipeline in-situ or removing it.

6.1.1 Pipeline route

The suitable route for the new supply pipeline will be influenced by the positioning of the new ground level reservoir. However, it is expected that the proposed supply pipeline will follow the same route as the existing pipeline up to the selected site of the new ground level reservoir as analyzed in Section 6.2. below. Three options were identified during the planning stage and are analyzed in this EIA study to determine the most favourable pipeline route:

Alternative 1: follows the route that was recommended by the Planning Report. The reservoir will be positioned at this position and the pipeline will cover about 5.62 km.

Alternative 2: follows the route of the existing pipeline to just before alternative option 1. If the reservoir is placed at this site, the pipeline will cover about 4.62 km.

Alternative 3: follows the existing route into the NamWater Premises in Henties Bay town. This means the reservoir will be placed in town and the pipeline will cover about 7.30 km.

6.1.2 Above ground vs buried pipeline

The NamWater Planning Division recommended that the planned replacement pipeline be buried next to the existing pipeline at a depth of 0.65 m for ease of construction and protection against the weather effects.

From the environmental perspective, if the pipeline is constructed above ground, it will restrict the movement of large animals. Burying the pipeline underground will enable free movements of the animal and will avoid the diversion of the stream flows at the Omaruru River crossing.

6.1.3 Pipe material selection

The location of the pressure reducer influences the pipe material selection. An investigation on two scenarios was done, to determine the location of the pressure reducer.

a) Scenario 1

For the first scenario, the pressure reducer is placed at the current off-take. The uPVC material was considered as the preferred pipe material for the proposed pipeline replacement. High-Density Polyethylene (HDPE) was proposed for the 0.8 km section of the Omaruru River crossing. It is assumed that the pressure in the pipe would be reduced to 43.4 m plus about 50 m of water hammer bringing the total to 93.4 m to reflect the maximum pressure required to reach the tower.

b) Scenario 2

For the second scenario, the pressure reducer is considered to be installed at the new proposed reservoir site. The preferred pipe material is Microcellular polyvinyl chloride (mPVC) Class 20 for about 5.2 km of the pipeline and HDPE class 20 for the section crossing the Omaruru River of about 0.8 km. It is assumed the pressure in the pipe would be about 115 m plus about 50 m of water hammer bringing the total pressure of 165 m in the pipeline to the tower/reservoir.

Scenario 1 is the most preferred in terms of the placement of pressure reducer and pipe material selection.

6.1.4 Abandoning the existing pipeline or removing it

The option of leaving the existing pipeline in the ground or removing was assessed in the section below.

Table 7: Materials for the existing pipeline

Type of materials	Length
160 mm diameter - Class 6 uPVC	1.34 km
150 mm diameter - steel	0.76k m
160 mm diameter - Class 6 uPVC constructed in 1984	0.41 km
150 mm diameter - Class C 90 m working pressure asbestos cement pipeline constructed in 1968	4.04 km

The larger section of the pipeline from the Omdel well field to the C34 road can be left in the ground to avoid and minimize disturbances to soil and local vegetation.

However, a discussion whether the section of the pipeline from the C34 road to the town's CBD should be left *in situ* or should be removed, is still ongoing between NamWater and the Henties Bay Municipality, due to the following reasons:

- The pipeline is running through private properties.
- The pipeline is running through an unused part of the cemetery, and it could be encountered during the digging of graves and may result in serious negative repercussions.
- The pipeline will no longer be useful to either NamWater or the Henties Bay Municipality, given its size, class, and age.

6.2 New ground level reservoir

6.2.1 Locality

To meet the two-day storage requirements of the bulk water scheme, the replacement of the two existing ground level concrete reservoirs, with a new reservoir of 5 000 m^3 is proposed. Three alternative sites were identified for the positioning of the new ground level reservoir.

Figure 10: Proposed pipeline route and alternative sites for the new ground level reservoir

a) Alternative 1

The site is located about 5.62 km from the Omdel off-take along the existing pipeline route. The site is situated at about 2.70 km east of the intersection of the C34 and DR 1918 (Usakos) roads at approximate latitude 22°06'36.42" S; and longitude 14°17'43.08'' E. Using Google Earth, the ground elevation of the proposed reservoir site is around 40 Meter Above Sea Level (m.a.s.l.)

The supply pipeline will follow the route that was recommended by the planning report. The pipeline section will be comprised of the following two components, a 5.62 km long, 250 mm diameter class 9 uPVC section and a 0.76 km long, 250 mm diameter steel section crossing the Omaruru River will be constructed.

Advantages of this site:

- The site has been recommended by the Henties Bay Municipality as it will enable the Municipality to gravitate the water from the new reservoir to the reticulation system. This will help in solving the current operation issues/concerns raised in section 5.4.5.
- The site is outside the built-up area; therefore, the construction works will have minimal impacts on the adjacent land users. The construction of the new pipeline will not also disrupt the existing water supply.
- This site is in the proximity of the proposed future industrial and agricultural developments that require a large quantity of water; hence it is an ideal position to supply water to these areas.
- The reservoir at this site can still be linked to the two existing bulk water storage facilities in town (800 m^3 reservoirs, booster, and tower), however, this depends on the future of this infrastructure which still needs to be decided on.
- The land has been offered to NamWater free of charge by the Henties Bay Municipality.

Disadvantages of this site:

- Additional work will be required before the site can be utilized such as subdivision, surveying, land servicing, etc.
- According to NamWater (2016), positioning the ground level reservoir on this site will cause breaking of the pressure head supplied by the boreholes thereby making it impossible for the water from the Omdel off-take to gravitate into the existing tower.
- Additional services such as electricity supply line, sewer reticulation system, communication service lines, etc., are still required.
- Boosting into the existing tower at the NamWater premises and in the Municipality reticulation system will still be required.

b) Alternative 2

The site is located in proximity to alternative site 1 and will cover about 4.65 km from Omdel west field. The proposed supply pipeline will follow the same route as for alternative site 1 and lies about 0.70 km just before the C34 road and about 1 km from alternative site 1 (Figure 10).

Advantages and disadvantages of this site:

The site has the same biophysical settings and carries the same advantages and disadvantages as alternative site 1. However, it is not a preferred option because it is located before the C34 road. It will therefore be very difficult and costly to reticulate treated water across the road (C34) to the town network.

c) Alternative 3

The third option is to have the ground level reservoir at Erf 419 located in town next to the existing bulk water storage facilities on Erf 420. The supply pipeline will follow the existing pipeline route and will cover about 7.30 km. This was the initial preferred alternative site by NamWater. However, positioning the ground level reservoir on this site will not address the low water pressure currently experienced in the Municipality reticulation network, hence it is the least preferred site.

Advantages of this site:

- The land already belongs to NamWater
- The land is already serviced and zoned “Government”, thus can be used for the intended purpose.
- There is already an existing pump station, chlorination facility, and telemetry.

Disadvantages of this site:

- Maintaining the existing supply scheme is not the ideal option as it will not aid in solving the current low water pressure issues being experienced in the Henties Bay Municipality distribution network.
- Water would still need to be pumped back to the rapidly developing southern parts of Henties Bay which mighty reduce the water pressure even further.
- Construction works will be disruptive for the adjacent land users
- NamWater will be required to reroute the section of pipeline from the C34 road to the ground level reservoir which currently passes through the cemetery and private properties.

The recommended site for the new ground level reservoir is alternative site 1. This is mainly because the site is located outside the built-up area. Furthermore, the site has a high elevation; and it will thus allow the Municipality to gravitate water into the reticulation system with high pressure, without having to pump.

6.2.2 Ground level reservoir design

The proposed 5000 m^3 circular reservoir will have the following components:

- 300 mm thick concrete wall
- 250 mm concrete roof slab
- 16 circular columns with a diameter of 400 mm
- Column footings of 2000 x 2000 x 500 mm spaced at 6 m intervals
- 250 mm concrete floor
- Pipework for the inlet, outlet, and scour including maintenance holes to be manufactured from Grade 316 stainless steel.
- The pipework for the outlet, scour and overflow will be a 250 mm diameter mPVC pipe.

6.3 The new Henties Bay supply scheme

The new HWSS will entail the construction of a new supply pipeline from Omdel off-take and a new ground level reservoir with a capacity 5 000 m^3 at Alternative site 1 (Figure 10).

The proposed supply pipeline will be 5.62 km long and will consist of a 250 mm diameter uPVC class 9 (4.86 km) from the Omdel off-take and a 0.76 km steel pipe at the crossing of the Omaruru River buried at a depth of 0.65 m.

The Henties Bay Municipality will be responsible to construct a new booster pump station to provide pressure into the reticulation network, especially for areas located far from the town CBD i.e., North Dune, and new industrial areas, as well as constructing all distribution pipelines connecting to this network. Water can also be boosted into the existing two 800 m^3 ground level reservoirs located at the town CBD.

According to NamWater 2016, bulk power supply, telemetry, monitoring and control equipment, chlorination facilities, office, and workshops will also be constructed at the new ground level reservoir site. A bulk sales meter will be provided at the base of the 5 000 m^3 ground level reservoir. The Henties Bay Municipality is also expected to construct a booster pump station and connect pipeline (s) from the pump stations to the reticulation network.

In summary of the assessment presented in the previous section (Section 6.1), it is evident that the preferred HWSS as presented in Figure 11 below will be consisting of both NamWater controlled Scheme and Henties Bay Municipality controlled Scheme.

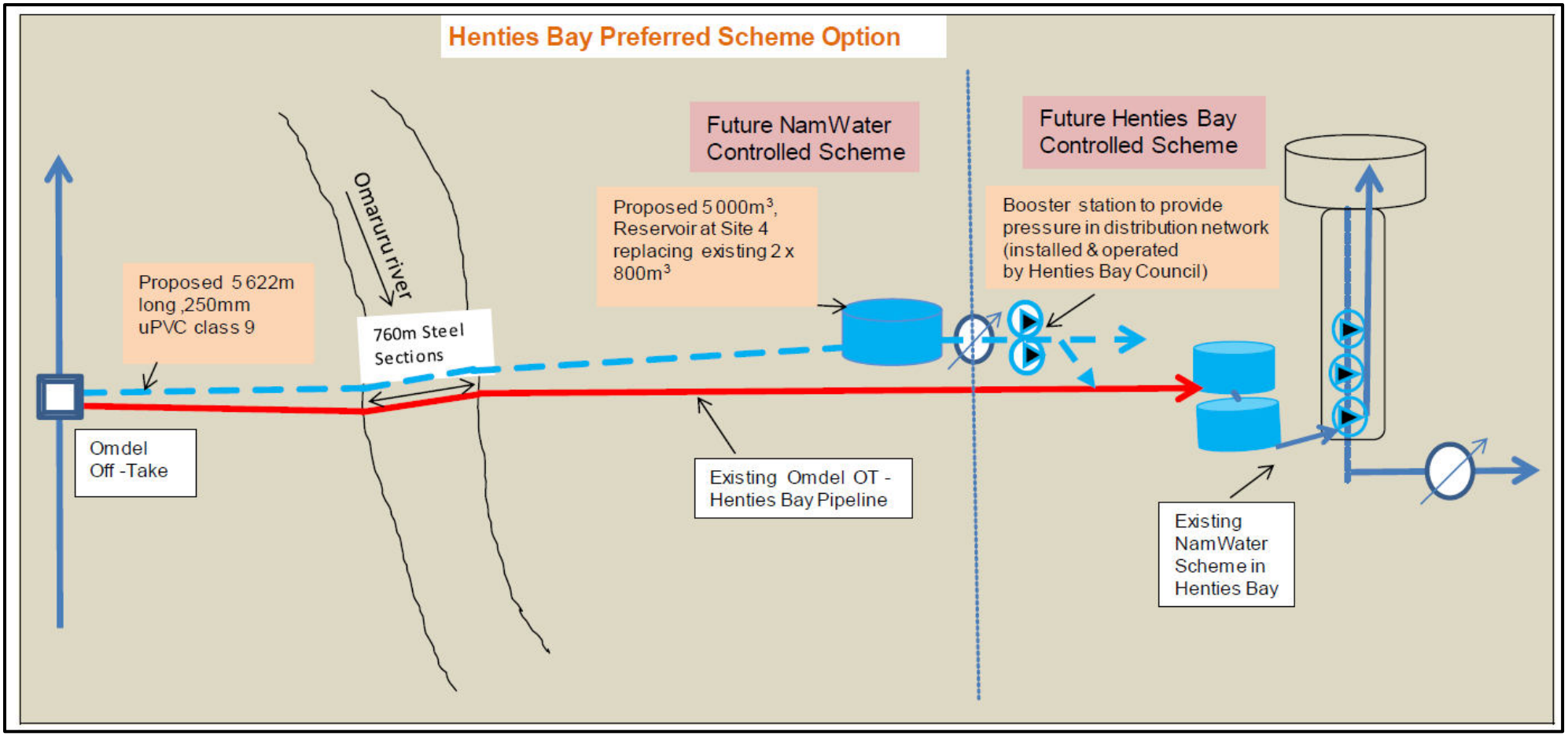


Figure 11: Preferred Scheme Option Schematic (Source: NamWater, 2016)

6.4 Resource requirements

6.4.1 Project costs

The total project cost for the replacement of the Henties Bay Pipeline and construction of the new ground level reservoir is estimated at N$ 40 million.

6.4.2 Source of construction materials

Most of the construction materials i.e., sand, cement, gravel, stone, etc are available locally, but some materials e.g., pipes, clamps, and pumps will have to be imported.

6.4.3 Land requirements

According to the preliminary design, all proposed construction works for the proposed pipeline and new ground level reservoir will take place within Henties Bay Townland. In their commitment letter, the Henties Bay Municipality has offered to donate a portion measuring about 2ha of the Henties Bay Townlands No. 133 to NamWater. The reservoir will have a diameter of 40 m plus an additional offset of 10 m around it for manholes and other infrastructure. In the case, the capacity needs to be upgraded in the future, the space will be available for a second reservoir. The booster pump stations and chlorine room if required, can also be constructed at the same site.

NamWater needs to register a servitude of the existing and the new pipeline so that no future excavation or construction work is done on this land. The future of the existing facilities at NamWater premises in town should be discussed by NamWater and the Henties Bay Municipality.

6.4.4 Electricity consumption and requirements

The new reservoir and associated infrastructure will be connected to the existing Erongo RED power grind, bout 80 m from the site. The envisioned power requirements are still to be confirmed upon completion of the Design, but a 250 kV and 3 phase transformer is envisioned. The powerline infrastructure will consist of wooden poles, a power cable and a transformer. Electricity is required for different Scheme operational activities such as.

- Pump station
- Booster pumps
- Office use and lighting

6.4.5 Workforce requirement during construction

Construction of the pipeline, ground level reservoir and associated infrastructure will be outsourced to contractors. Temporary jobs during this phase will be created in a form of contract labourers. The actual number of jobs to be created during the construction phase is not known yet, but a project of this nature often creates between 30-50 temporary job opportunities.

6.4.6 Workforce requirements during operation

The current HWSS is only operated by one person i.e., the Waterworks officer, who oversees metering, pumps, and chlorination.

The operation of the new reservoir and associated infrastructure will require additional supporting staff to be employed by NamWater. These will be such as artisans, cleaner, security, etc., to ensure the smooth operation.

7. DESCRIPTION OF THE RECEIVING ENVIRONMENT

This chapter presents the environmental baseline of the receiving environment. It entails a description of various environmental receptors that are likely to be affected by the proposed project. This includes both the socio-economic and biophysical aspects.

The impacts on socio-economic aspects will affect a greater geographical area e.g., constituency, regional and national. Hence, the description of the socio-cultural-economic baseline provided for the study area corresponds to the extent of the community in which the project is taking place. On the other hand, the baseline study area chosen for physical and ecological data collection is mainly the area that is in the direct zone of influence of the proposed pipeline and new reservoir, its process facilities, and supporting infrastructures.

7.1 Social Environment

7.1.1 About the town

Henties Bay is a coastal town in the west coast of Namibia. It is located 70 km north of Swakopmund and it mostly serves as a holiday settlement. Halfway through (35 km) to Henties Bay from Swakopmund lies a settlement of Wlotzkasbaken. Some 60 km to the north of the town is the seal colony of Cape Cross. Politically, Henties Bay falls within Arandis Constituency in Erongo Region of central-eastern Namibia.

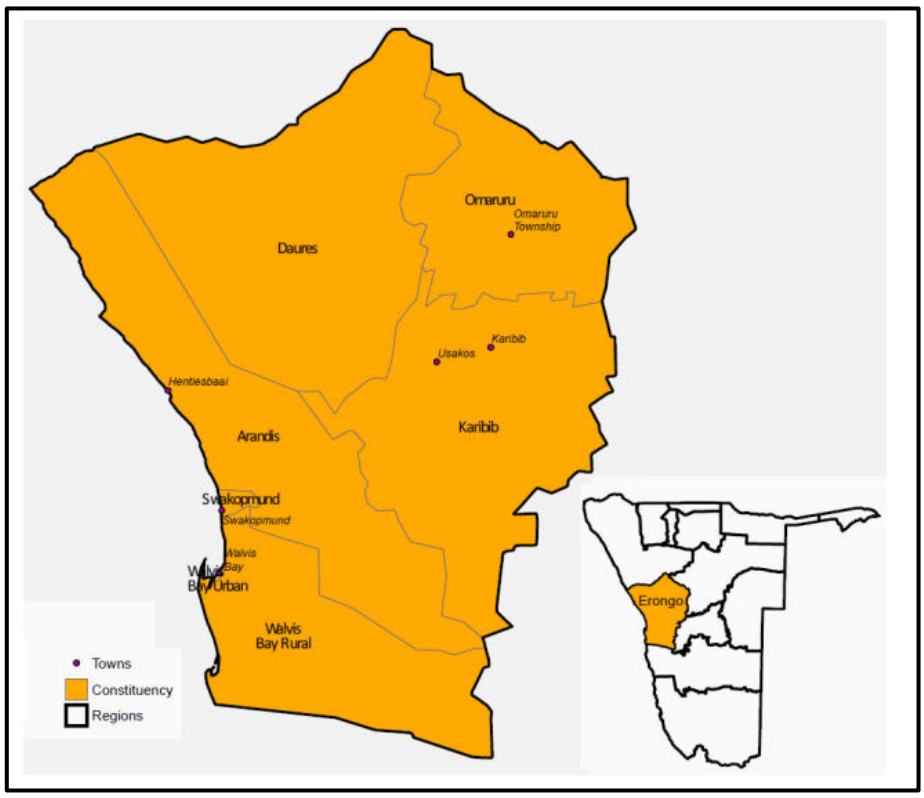


Figure 12: Henties Bay Location Map

7.1.2 Population demographics

The statistics are shown in **Table 8** below are derived from the 2011 Namibia Population and Housing Census (Namibia Statistics Agency, 2013), and presented from a local and regional perspective.

Table 8: Statistics of the Arandis Constituency and Erongo Region (Namibia Statistics Agency, 2011)

ARANDIS CONSTITUENCY	
ATTRIBUTE	**INDICATOR**
Population (Henties Bay)	4 720
Population	10 093
Females	4 852
Males	5 241
Population under 5 years	10%
Population aged 5 to 14 years	64%
Population aged 15 to 59 years	64%
Population aged 60 years and above	8%
Female: male ratio	108:100
Literacy rate of 15 years old and above	98%
People above 15 years who have never attended school	4%
People above 15 years who are currently attending school	13%
People above 15 years who have left school	80%
People aged 15 years and above who belong to the labor force	71%
Population employed	72%
Homemakers	5%
Students	49%
Retired or old age income recipients	46%
Income from pension	10%
Income from business and non-farming activities	6%
Income from farming	1%
Income from cash remittance	3%
Wages and salaries	72%
Main Language (Erongo Region)	Oshiwambo-38.8%
ERONGO REGION	
ATTRIBUTE	**INDICATOR**
Population	150 809
Population aged 60 years and above	6%
Population aged 5 to 14 years	17%
Population aged 15 to 59 years	64%

7.1.3 Economic and social development

Henties Bay is predominantly a tourist destination for anglers and 4x4 enthusiasts. Its property market has expanded significantly since the late 1990s, particularly for holiday accommodation.

The town is made of two formals residential township areas namely, Henties Bay and Omdel. The formal townships are made of about 4400 households and are further divided into extensions i.e., Henties Bay proper, Extension 1, etc. There are currently 22 formal township extensions in Henties Bay of which 18 are developed while four are proposed. There is also an informal settlement with about 300 informal houses (Henties Bay Municipality, 2021).

The town is served by a government public clinic, a pharmacy, and private doctors' consulting rooms. In terms of education, the town is served by one government school, a private school, and several private Early Childhood Development Centres. There is a University of Namibia Campus, and a National Youth Centre.

The main economic activities in the town are tourism, angling, sporting, agriculture, accommodation, etc. Being a holiday destination, Henties Bay boasts numerous small pubs and restaurants, a hotel, guesthouses, B&B's. There are also several holiday houses for rent, especially during the festive season.

Although the town's business centre is small, there are several shops and amenities such as supermarkets, bottle stores, banks, and ATMs. The town is well connected to the national road network through the C34 road from Swakopmund and linking the town to tourist hotspot areas of Torra Bay, Mowe Bay, and the prominent Brandberg mountains and Damaraland on the north-east of town (Henties Bay Municipality, 2021).

7.1.4 Water and sanitation

All properties within the formal residential areas have access to clean drinking water and are connected to the Municipal sewage system. Informal settlements are served with communal taps and common ablution facilities in the form of dry pit latrines.

7.1.5 Archaeological and Heritage Context

The subject sites are not known to be of any historical significance. There are also no significant archaeological and heritage sites that are known to be located within the proposed development area.

7.2 Biophysical Environment

7.2.1 Climate

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

The weather along the coast of Namibia is relatively different from that inland. The coastal climate is characterized by lower rainfall, lower temperature, less radiation and sunshine, stronger winds, and frequent fog (Mendelsohn *et al*., 2002). The average annual temperature ranges between 16°C and 17°C.

The average maximum temperature for Henties Bay varies between 20°C and 22°C with the average minimum temperature between 8°C and 10°C. The warmest months are between December and March with temperatures between 20°C and 30°C and the cold, foggy months from August to October with temperatures between 14°C and 18°C.

As depicted in Figure 12 below, the average evaporation rate of the area is less than 1 680 mm annually (Mendelsohn, *et* al 2002).

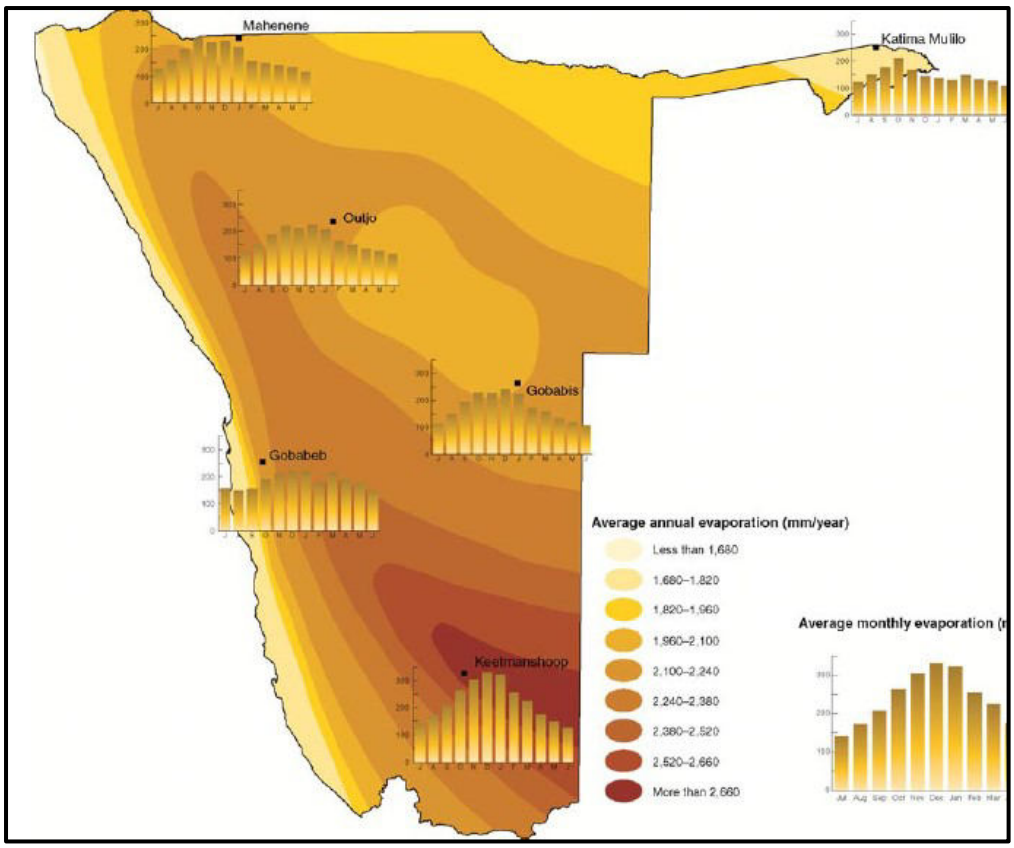


Figure 13: Average Evaporation rate (Mendelsohn, *et al* 2002)

- **Precipitation**

Along with the coast, rainfall is much less than further inland. The average annual rainfall for Henties Bay is less than 50 mm per year as indicated in Figure 14 below.

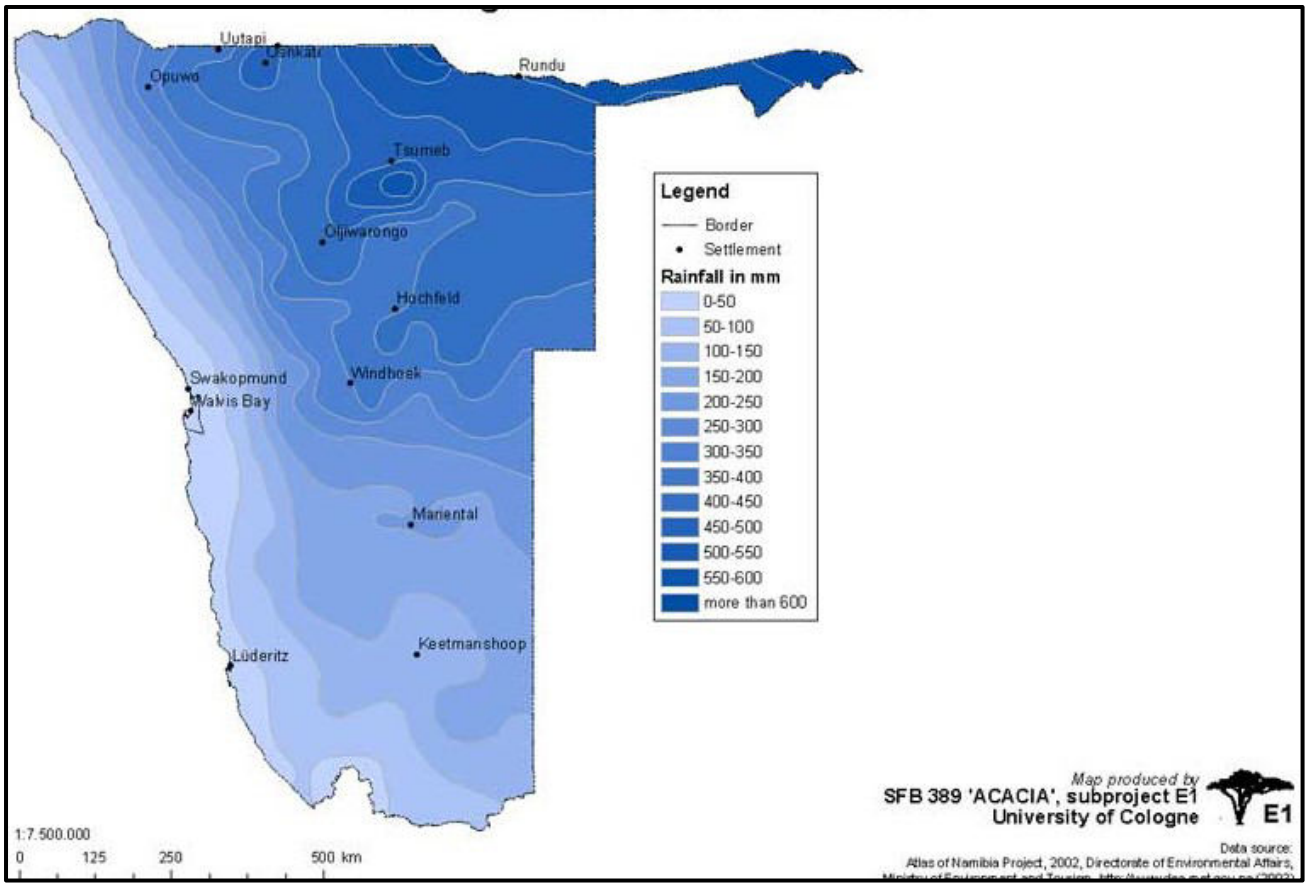


Figure 14: Average annual in Namibia

- **Wind conditions**

East wind conditions normally occur in winter when the interior experience cold fronts, causing strong, hot winds and sandstorms coming from the desert. East winds with sandstorms are the strongest during the morning, normally calming down in the afternoon with glorious late afternoons and evenings (Henties Bay Municipality, 2021).

7.2.2 Topography

The topography of Henties Bay and the project area is characterized by an extremely flat area with an average altitude level of 26 m.a.s.l. The site for the proposed ground level reservoir has an elevation of 40 m.a.s.l which is about 10 meters higher than the elevation of the town centre (27 m.a.s.l) where the distribution meter is located (See Figure 14 below).

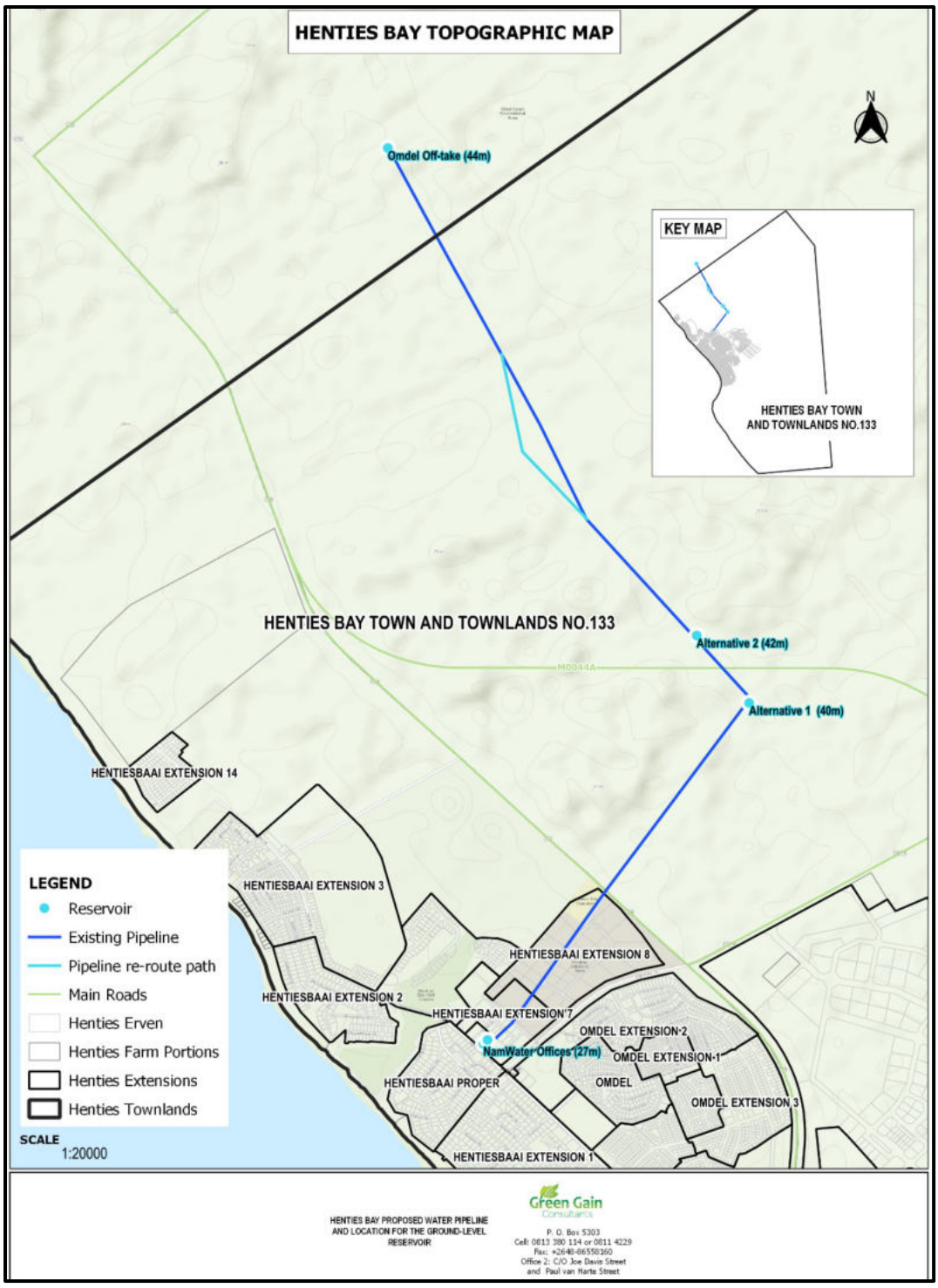


Figure 15: Elevation of Henties Bay town and surrounding

7.2.3 Soils

The dominant soils in the area are Petric gypsisols and Petric calcisols. Both soils contain abundant quantities of calcium sulfate (gypsum).

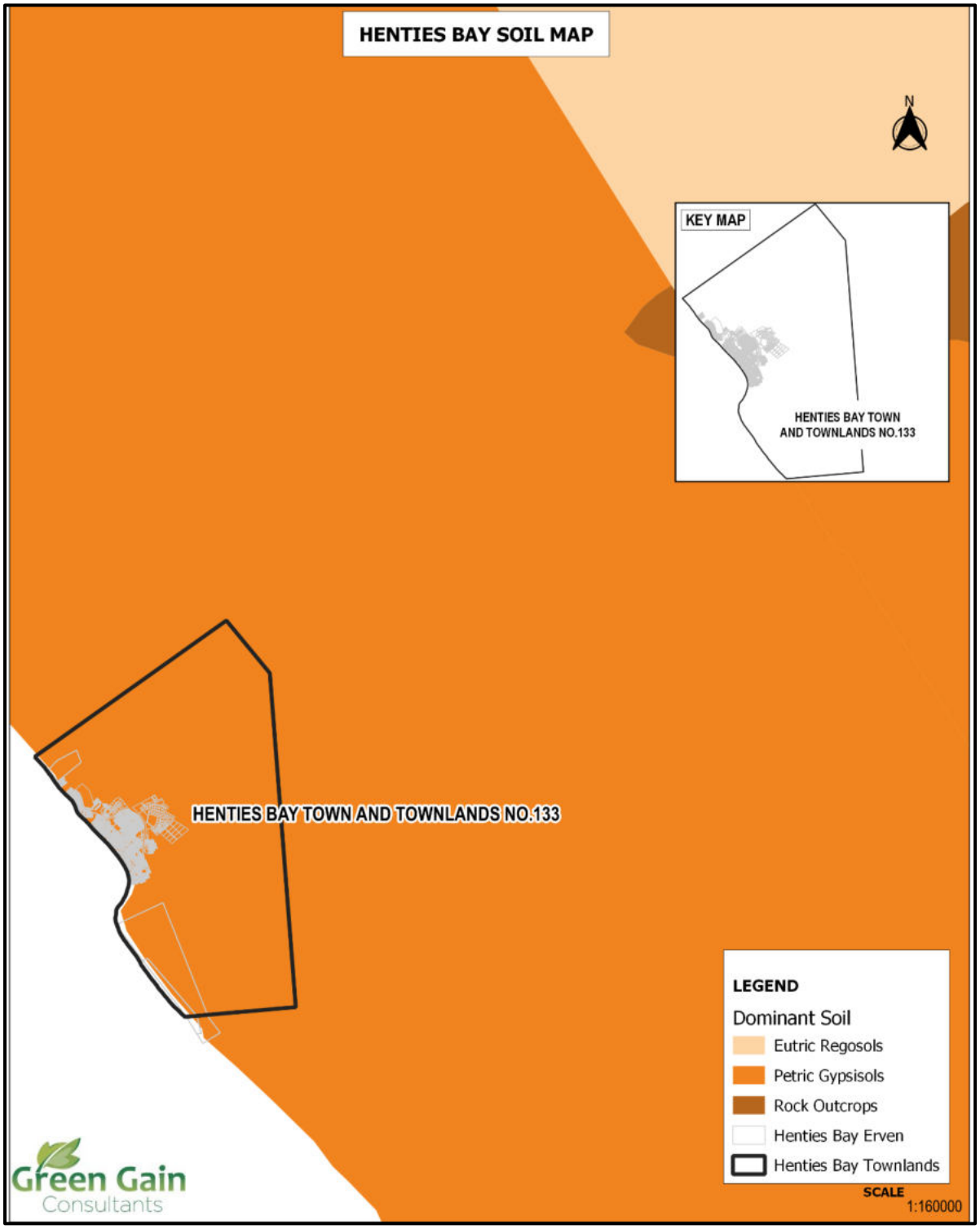


Figure 16: Local occurring soils

7.2.4 Geology

The geology of the Henties Bay area is made up of Damara sequence rocks of the quaternary age which dates back 137-132 million years ago as shown in Figure 17 below. The Damara sequence belongs to the Swakop Group which is made up of the Khomas and Ugab sub-groups which are classified as hard rock formations.

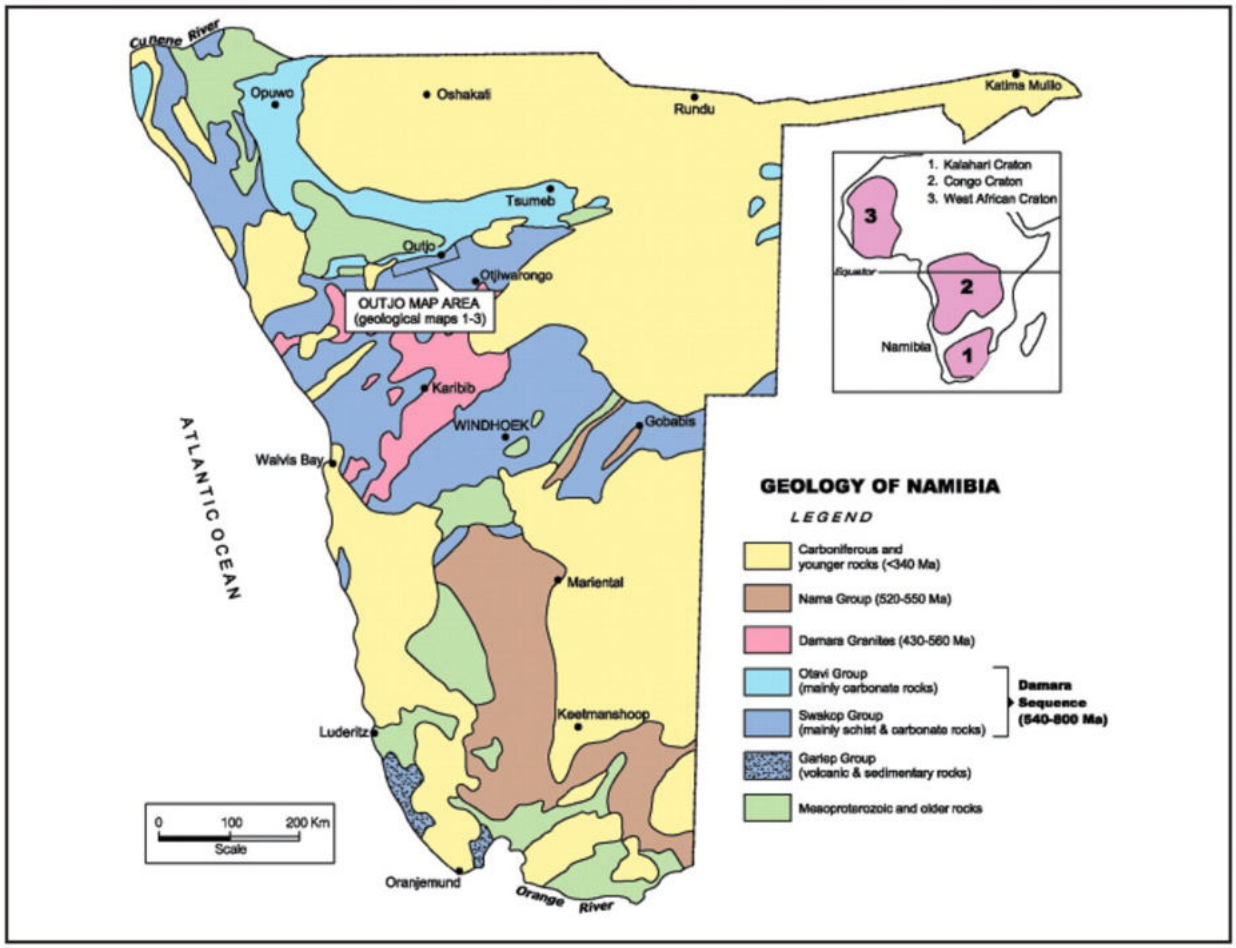


Figure 17: Geological map of Namibia (Source: Miller, R. McG, 2008)

7.2.5 Hydrology

One of the prominent hydrological features of the Henties Bay area is the Omaruru River (Figure 18) which flows into the Omdel Dam and then to the sea. Henties Bay town is supplied with groundwater from the Omaruru River basin. Both the existing pipeline and the new pipeline cross through this river.

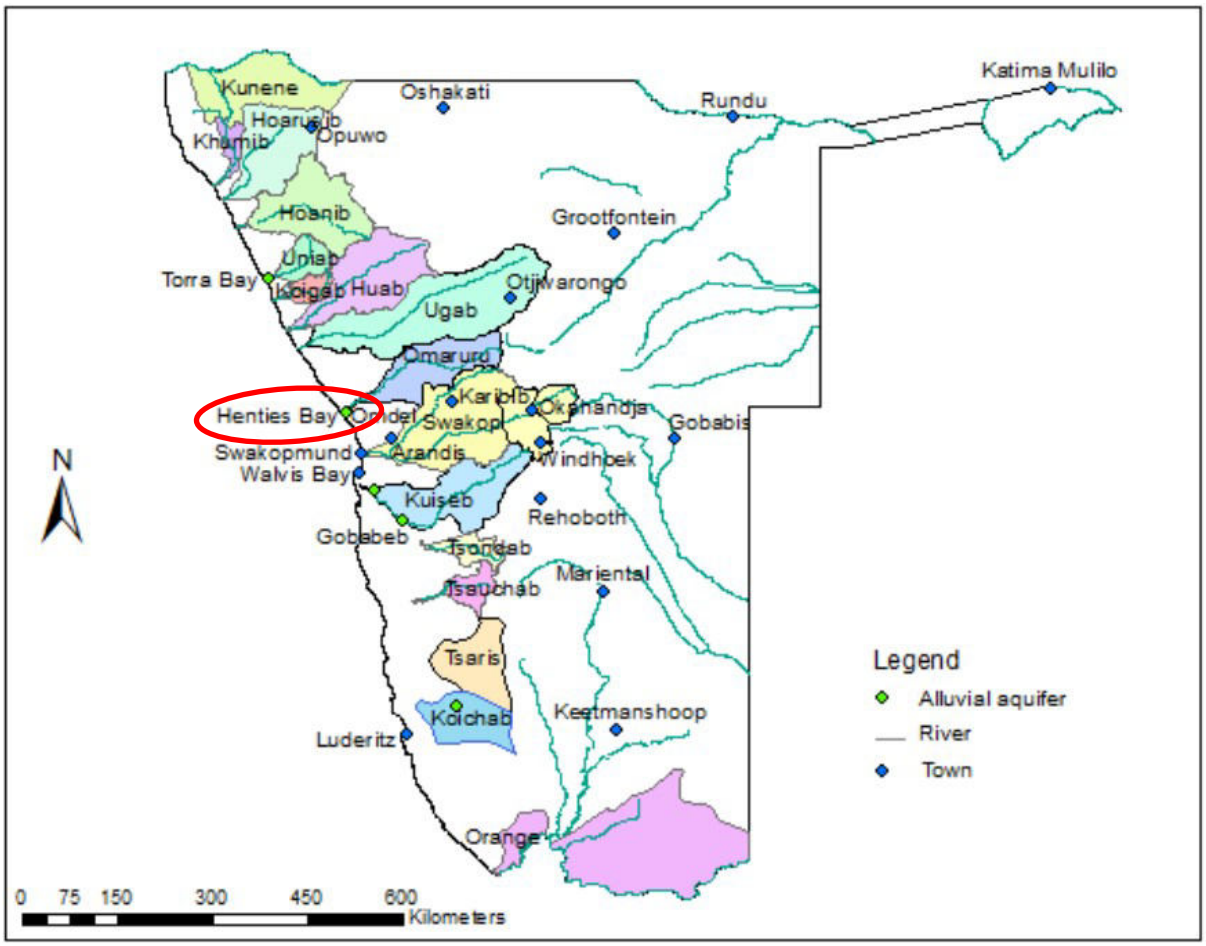


Figure 18: Hydrography map of Namibia (Rivers, basins, pans, and lakes) (Source: Chivell EH & Crerar SE. 1992)

7.2.6 Landscapes

Henties Bay falls within the Namib Desert Biome and Central Desert vegetation type and is bordered by the Dorob National Park and has few restrictions, particularly for off-road driving on the beach and across the plains. There are areas along the coast with high concentrations of lichen fields and are thus of ecological significance. The lichen field which was declared as an Important Plant Area is located north of Wlotzkasbaken (27 km south of Henties Bay). The Damara Tern breeding sites, usually in soft dune sand found along the coastline are also considered to be areas of ecological importance (NACOMA, 2013), however these areas are not affected by the proposed pipeline route and the ground level reservoir site.

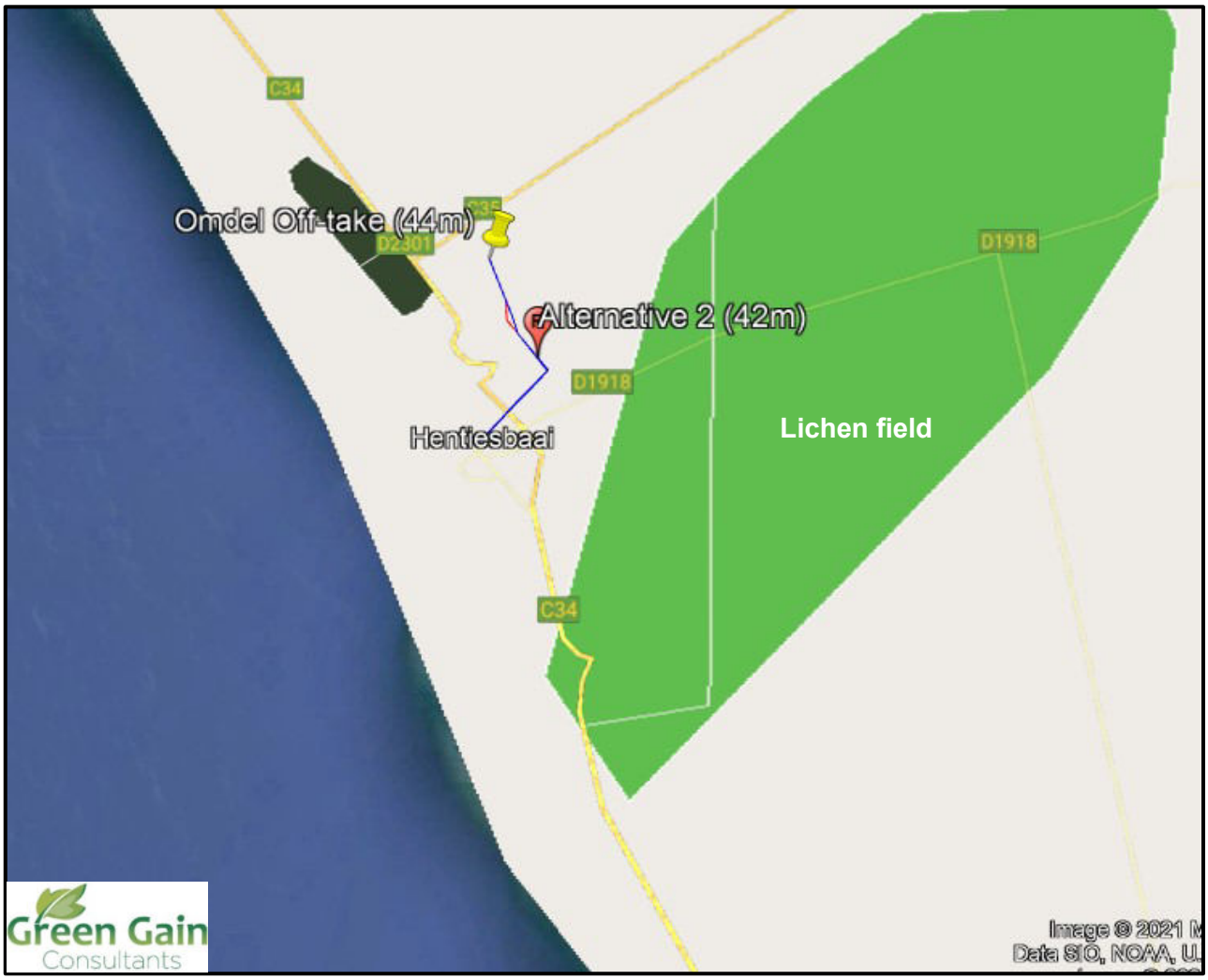


Figure 19: Location of the lichen field in relation to the proposed pipeline route and ground level reservoir site (Source: NACOMA, 2013).

7.2.7 Local occurring flora and fauna

The area along the proposed pipeline route and ground level reservoir site is dominated by Pencil bush (*Arthraerua leubnitzia*) which are sparely distributed.

Figure 20: Local occurring flora

The local occurring fauna expected to occur at the site and surrounding area include reptiles, birds such as Damara terms (*Sternula balaenarum*) and small ground burrowing animals such as *lizards, snakes, and different types of rodents* while large mammals that are known to frequent the Henties Bay area are *black-backed jackal*, *brown hyena*, *oryx and zebra* (NACOMA, 2013).

Figure 21: Local fauna

The proposed pipeline route and ground level reservoir site are located within the Henties Bay townlands. The proposed pipeline route will follow the existing NamWater pipeline, hence, the site is already disturbed by the current pipeline maintenance works and the movement of vehicles and people. There are also no sensitive flora or habitats and no fauna with territorial needs within the proposed development sites.

8. ANTICIPATED ENVIRONMENTAL IMPACTS

This section provides anticipated environmental impacts (short-term and long-term) associated with the planning & design, construction, operation, and decommissioning of the proposed Henties Bay Pipeline and the ground level reservoir. According to the EIA Regulations, the term "environment" is referred to the complex of natural and anthropogenic factors and elements which include both the natural environment and the human environment. Hence, the assessment considered the potential impacts on the existing socio-economic and biophysical settings of the receiving environment as well as the future township developments in the area.

8.1 Impacts rating scales.

In assessing the impact of the proposed development, four rating scales were considered. Each issue identified was evaluated in terms of the most important parameter applicable to environmental management. These include the ***extent, intensity, probability, and significance*** of the possible impact on the environment and whether such effects are positive (beneficial) or negative (detrimental). The rating scales used are as follows.

Table 9: Impact rating scales

CRITERIA	DESCRIPTION			
EXTENT	**National (4)** The whole country	**Regional (3)** Erongo Region and neighbouring regions	**Local (2)** Within a radius of 2 km of the development site.	**Site (1)** Within the development site
DURATION	**Permanent (4)** Mitigation either by man or natural process will not occur in such a way or such a period that the impact can be considered transient	**Long-term (3)** The impact will continue/last for the entire operational life of the development but will be mitigated by direct human action or by natural processes thereafter.	**Medium-term (2)** The impact will last for the period of the project phase, whereafter it will be entirely negated	**Short-term (1)** The impact will either disappear with mitigation or will be mitigated through a natural process in a span shorter than the construction phase
INTENSITY	**Very High (4)** Natural, cultural, and social functions and processes are altered to extent that they permanently cease	**High (3)** Natural, cultural, and social functions and processes are altered to extent that they temporarily cease	**Moderate (2)** The affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified way	**Low (1)** The impact affects the environment in such a way that natural, cultural, and social functions and processes are not affected
PROBABILITY	**Definite (4)** The impact will certainly occur	**Highly Probable (3)** Most likely that the impact will occur	**Possible (2)** The impact may occur	**Improbable (1)** The likelihood of the impact materializing is very low
SIGNIFICANCE	Is determined through a synthesis of impact characteristics. Significance is also an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.			

Table 10: Description of the significance of impacts

Low impact	A low impact has no permanent impact of significance. Mitigation measures are feasible and are readily instituted as part of a standing design, construction, or operating procedure.
Medium impact	Mitigation is possible with additional design and construction inputs.
High impact	The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.
Very high impact	Permanent and important impacts. The design of the site may be affected. Intensive remediation is needed during construction and/or operational phases. Any activity which results in a "very high impact" is likely to be a fatal flaw.
Status	Denotes the perceived effect of the impact on the affected area.
Positive (+)	Beneficial impact
Negative (-)	Deleterious or adverse impact.
Neutral (/)	The impact is neither beneficial nor adverse
It is important to note that the status of an impact is assigned based on the status quo. Therefore, not all negative impacts are equally significant.	
Significance Rating Scale Points 1-4 Insignificant/low Points 5-8 Significant /Moderate Points 9-12 Very significant/High. Points 13-16 Highly significant /Very high	

The significance of each impact has been rated before and after mitigations measures. The implementation of mitigations is expected to reduce the significance of impacts using at least two (2) scales.

8.2 Anticipated impacts: 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. Issues to be considered at the planning and design phase of the proposed new Henties Bay Pipeline and the ground level reservoir are as follows.

- Sitting of the new pipeline route
- The proposed pipeline capacity/size
- Siting of new ground level reservoir and capacity
- Electricity/power availability/sufficiency
- Water pressure to the Municipal reticulation network
- Potential impacts to future land use of the area

- *Sitting of the new pipeline route*

The proposed new pipeline will follow the same route as the existing pipeline, and it will be buried at a depth of 0.65 m just next to the existing pipeline for ease of construction and protection against the weather effects.

Moreover, the existing pipeline is crossing through the fence of the NYS centre and the newly tarred C34 road is built on top of it. Hence, the proposed new pipeline will be rerouted outside the NYS canter fence and to cross the C34 road under the culvert just a few meters away from the current crossing to ensure smooth operations during the maintenance phase.

Measures

- ✓ The servitude for the proposed pipeline should be registered with the Deeds Registry Office. This should also be incorporated in the Henties Bay Town Planning Scheme to safeguard the pipeline from future developments.
- ✓ The pipe material at the Omaruru River crossing should be HDPE instead of steel as initially planned. This is mainly because steel materials are susceptible to breakage and interrupt the flows by blocking sediment materials in case of heavy flows. On the contrary, HDPE pipe will float, thus allowing water to flow on top and under it without the pipe breaking.
- ✓ The size of the culvert (750mm) at the C34 road is sufficient to accommodate the proposed pipeline (250mm), leaving sufficient space to allow flood flows. According to RA, (2021), the pipeline should enter and exit the culvert at a 90-degree perpendicular to the road, for a distance of 10 m. Approval should also be obtained from the RA for this work before construction.

- *The proposed pipeline capacity/size*

In terms of the pipeline capacity, the size of the existing pipeline (150 mm) was found not to be sufficient to supply the required amount of water as per projected future demand. Hence, the existing pipeline will be decommissioned and replaced with a bigger pipeline (250 mm) to meet the projected future water demand of the town. The option of whether to leave the existing pipeline in the ground or to exhume is explained under Section 6 and the decommissioning phase.

- *Siting of new ground level reservoir and capacity*

According to the NamWater Developmental Proposal for the Henties Bay pipeline of 2016, the proposed HWSS will differ from the existing Scheme. The proposed scheme requires the new ground level reservoir and associated infrastructure to be located at a new site (Alternative Site 1) as per Figure 10.

Measures:

- ✓ The capacity of the proposed ground level reservoir of 5000 m^3, corresponds to the projected future water demand including NamWater' s two-day storage norm.
- ✓ A geotechnical investigation should be conducted on the proposed site for the new ground level reservoir to determine the engineering requirements for the floor design for the new ground level reservoir.
- ✓ NamWater must engage with the Henties Bay Municipality to apply town planning procedures on the proposed site for the new ground-level reservoir.
- ✓ Upon subdivisions and rezoning, the site for the new ground level reservoir should be zoned as "Parastatals" in accordance with the Henties Bay Town Planning Scheme.
- ✓ Provisions should be made for a perimeter fence around the area of the proposed ground level reservoir and associated infrastructure.
- ✓ The provision of a security guardhouse should be made to protect the properties from vandalism and assure the safety of operators while on duty.
- ✓ Provision must be made for one access road to the site to minimise disturbances from vehicle movement during the construction and operation phase.

- *Electricity/power availability/sufficiency*

The operation of the new ground level reservoir and associated infrastructure requires about a 250 kV supply line and a 3-phase transformer. This will be obtained from the existing Erongo RED overhead powerline, about 80 m distance from the site.

Measures:

- ✓ Official application for power supply to the site should be submitted to Erongo RED.
- ✓ Explore the alternative sources of power to supplements the power supply

- *Water pressure to the reticulation network*

It has been reported that there is currently a problem of persistent low pressure in the Municipal reticulation network, especially in the southern and northern parts of the town. The situation often becomes worse during the festive season when more visitors frequent the town. Hence, the new HWSS must help to address this challenge. It is for this reason that the Municipality has recommended for the new ground level reservoir to be located at Alternative site 1 (Figure 9), which is more elevated than the town centre. This will allow the water to gravitate to the distribution tower and other parts of the town with high pressure.

Measures:

The Henties Bay Municipality must

- ✓ Construct a booster pump station and other associated infrastructure as per the initial development proposal.
- ✓ Construct connecting pipelines from the new ground level reservoir to different sections of the town to address the pressure problem.

- *Potential impacts of future land use in the area*

It must be noted that the proposed development is taking place within Henties Bay Townlands and within the natural expansion zone of the town. Although the land-use zoning is still undetermined, it is expected that the entire area will be used for future township developments. Hence, in order to safeguard the pipeline from future developments, a servitude must be registered for the new pipeline route.

8.3 Anticipated negative impacts: construction phase.

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

a). Negative impacts to the natural environment.

- Disturbance to local flora and fauna
- Soil disturbance from bulk earthworks and civil works
- Damage to geological resources
- Risks of fuel spills or leaks
- Dust and air pollution
- Waste generation
- Groundwater contamination

b). Negative impacts on the socio-economic environment.

- Land use effects
- Disturbances from traffic movement
- Migrant construction workers
- Safety, security, and health hazards
- Impacts of temporary construction camps and workshops
- Landscape and visual impacts

These impacts have been explained in detail below.

- *Disturbance to local flora and fauna*

The overall distance for the proposed pipeline from Omdel off-take to the new ground level reservoir will cover about 5.6 km stretch with a working corridor of 20-30 meters while the size of the new ground level reservoir is about 2 ha in extent.

Disturbance to the local occurring flora mainly the pencil bush (Figure 20) and fauna i.e., lizards, jackals, birds, reptiles (Figure 21) will occur as a result of vegetation clearance and vehicle traffic movement during the construction phase. Other construction activities such as sand padding, grading, stockpiling of materials or waste, and uncontrolled off-road driving may also damage the local vegetation and disturb the local fauna.

Impact Type	**Ratings (before mitigation/measures)**				**Significance**	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	*1*	*2*	*2*	*1*	*6*	*4*

All disturbances will be limited to the working site along one side of the pipeline route and at the ground level reservoir construction site. The affected local vegetation of the development site is locally common and no sensitive flora species are present along the pipeline route or at the ground level reservoir site. Moreover, the most popular lichen field is located about ±27 km southeast of town and far from the proposed development sites. On the other hand, the local fauna is mobile and no species with territorial needs will be affected by the construction works.

Measures:

- ✓ Existing access routes should be used as far as possible
- ✓ Control offload driving by erecting warning signs along with the site
- ✓ Vehicles must be driven by authorized drivers
- ✓ All employees must be sensitised to minimise disturbances
- ✓ Avoid killing or trapping, chasing, or injuring any animal crossing or found along the pipeline route. Should there be a need to relocate wildlife or other animal from the construction site, call the Dorob National Park Wildlife Specialist as per the contact details provided in the EMP.
- ✓ Only prepare trenches in short sections sufficient to be worked for a short period i.e., a week, and avoid leaving empty trenches for far too long
- ✓ Open trenches should be demarcated with danger tapes to ensure the safety of animals and people.
- ✓ The construction site must be out of bound for the public
- ✓ Construction activities must be limited to daytime hours.

- *Soil disturbances and contamination from bulk earthworks and civil works*

Soil is one of the most important natural resources which support a community of diverse organisms. The excavation of trenches and movement of construction vehicles will disturb the organisms it contains and expose the soil to wind erosion. Soil may also be contaminated from leaks and spills from construction vehicles and improper chemical handling.

Impact Type	**Ratings (before mitigation/measures)**				**Significance**	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	*1*	*2*	*1*	*1*	*5*	*3*

Measures:

- ✓ Topsoil from the construction site must be carefully extracted and kept separate from construction waste for use as backfill materials.
- ✓ Limit the movement of vehicles within the construction working corridor and make use of existing access routes.

- ✓ The construction site for the new ground level reservoir should be fenced off during the construction phase and allow only one access route and entrance to the site to minimise disturbance from vehicle movement
- ✓ Reduce soil contamination by providing proper maintenance to the construction vehicles and machinery. Contaminated sand must be collected and disposed of at the Walvis Bay landfill site.

- *Damage to geological resources*

The alteration of topography due to excavations and bulk earthworks may disturb the surface geological settings. Given the nature of the soil of the site (Petric gypsisols and Petric calcisols) and the underlying rock and flat topography with no outcrops, no blasting is expected, hence limited impacts to the geological setting.

Impact Type	**Ratings (before mitigation/measures)**				**Significance**	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	*1*	*1*	*1*	*2*	*5*	*3*

Mitigation:

The disturbance to the local geology through excavation and construction works is inevitable and will not be limited to the proposed project activities since the entire area is earmarked for future townships development. Moreover, a geotechnical assessment should be conducted on the proposed ground level reservoir site and recommendations should be adhered to.

- *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, surface water, and groundwater, especially within the Omaruru River zone.

Impact Type	**Ratings (before mitigation/measures)**				**Significance**	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	*1*	*1*	*1*	*1*	*4*	*2*

Measures

- ✓ 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, a bunding wall, big enough to contain 120% of the volume of the fuel tank should be constructed at fuel storage and transfer site/s.

- ✓ All leakages and spillages of oil and grease should be contained, cleaned up, and disposed of at the Walvis Bay landfill site. Follow the spillage procedures as outlined in the EMP.

- *Dust and air pollution*

Excavation and construction-related activities i.e., cement mixing and backfilling will generate fugitive dust that can pose serious health risks and irritation to humans, especially those working on the construction site. However, the worst case of dust pollution would be during windy conditions. Other atmospheric pollution is in the form of fumes and noxious gases i.e., hydrocarbon vapours, carbon monoxide, and sulphur oxides released from vehicles and construction equipment.

Impact Type	**Ratings (before mitigation/measures)**				**Significance**	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	*2*	*1*	*1*	*2*	*6*	*4*

The emissions of dust and vibration from construction activities will occur for a short time and will likely be insignificant since the pipeline route is far from residential areas. During windy conditions, there will be a lot of dust coming from the desert environment.

Mitigation:

- ✓ When the wind speed exceeds 40 km/h, the construction work must cease.
- ✓ Ensure dust control measures such as sprinkling all haulage roads and construction areas with water. All cement mixing should be done in an enclosed area.
- ✓ All construction vehicles and machinery must be roadworthy and driven within the maximum driving speed limits.
- ✓ Cover dump trucks loaded with sand or other building materials with tarpaulin to contain dust emissions.

- *Waste generation*

Construction activities will generate several types of solid wastes such as waste rocks, food refuse, trash, scrap materials, oily rags, and empty products containers. Additionally, liquid waste from construction camps will be generated. All these types of waste will have a negative impact on surrounding areas if not disposed of properly and regularly. In addition, the process of transporting all construction debris may also disturb neighbouring areas and constitute a nuisance to residents around the site and may not be aesthetically acceptable.

Impact Type	**Ratings (before mitigation/measures)**				**Significance**	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	*2*	*1*	*2*	*2*	*7*	*5*

Mitigation

- ✓ All general waste generated at the site must be gathered and disposed to the Henties Bay waste disposal site.
- ✓ Recyclable waste i.e., empty product containers, paper, plastic, etc., should be collected, sorted, and supplied to the local recycling companies in Henties Bay, Swakopmund or Walvis Bay such as Scrap Salvage, Rent-A-drum, Environfill, and many more.
- ✓ Vehicles transporting waste should be sealed with a tarpaulin to avoid waste from being blown away by wind and prevent dust emissions.
- ✓ Provision must be made for sufficient portable ablution facilities during the construction period. In terms of the general health Regulations (GN 121. 1969), it is recommended to have at least 1 toilet within 500m along the pipeline route and 2 toilets for every 25 people (separate water closet for males and females) at the construction site. Sewage from ablution facilities should be contained in a septic tank and disposed of at the Municipality wastewater treatment plant.
- ✓ No refuelling or fuel storage will be permitted within the Omaruru Riverbank.
- ✓ Drip trays should be provided for vehicles and machines with leakages and such vehicles should not be parked for too long within the riverbank.
- ✓ All leakages and spills of oil and grease should be contained, cleaned up, and disposed of at the Walvis Bay landfill site.
- ✓ No cement works should be allowed in the Omaruru River
- ✓ The bank material and trench spoil should be stored separately

- *Disturbance to the hydrology of the Omaruru River*

The proposed supply pipeline will cross the mainstream of the Omaruru River by means of a 0.76 km steel pipe at a depth of 0.65 m.

Impact Type	**Ratings (before mitigation/measures)**				**Significance**	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	*2*	*1*	*1*	*2*	*6*	*4*

Measures

The Omaruru River hardly flows down to the sea, hence, it is unlikely that construction activities will pose any potential impacts to the hydrological features of the Omaruru River. However, the following measures should be ensured during construction.

- ✓ All trenches must be properly refilled, and the area must be levelled.
- ✓ Riparian vegetation should not be cleared as far as possible.

- *Groundwater contamination*

Groundwater is an important source of water in the area; hence measures must be in place to prevent contamination. The main impacts on groundwater associated with the pipeline construction could result from poor handling of liquid waste and chemicals, fuel spills, or leaks.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	*2*	*1*	*2*	*2*	*7*	*5*

Measures

According to Mendelsohn, J., *et al* (2002), The groundwater level in the area range occurs at a depth between 50-100 meters and around 20 m in the Omaruru River. Hence, it is not expected that the water table will be encountered during the construction of the new pipeline. The construction depth for the ground level reservoir will be determined by geotechnical investigations. Moreover, contractors should implement control measures on waste management and spill/leaks as outlined above.

- *Land use effects*

The large section of the proposed pipeline passes through vacant land and is far from the existing residential areas. The proposed pipeline route is located within the Henties Bay Townlands and approval has already been given by the Municipality. The only land uses affected by the pipeline route are the Omaruru river, C34 road, and the NYS centre.

The new ground level reservoir is also located on vacant land and within the Henties Bay Townlands. However, the site is closer to the C34 road and DR 1918 intersection. Disturbances due to vehicle movement and other construction-related activities are expected during the construction phase. Other noticeable impacts could be as a result of noise, dust, and vibration generated from the construction site. The process of transporting all construction materials can also constitute a nuisance to residents in the access streets.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	*1*	*1*	*1*	*2*	*5*	*3*

Measures

- ✓ Construction works should be limited to daylight and no work should be allowed during odd hours
- ✓ Construction materials i.e., pipes must be kept at the construction camps and only delivered when needed, rather than stacked onsite.
- ✓ Only use designated access roads
- ✓ The construction site for the new ground level reservoir must be enclosed/barricaded
- ✓ Erect warning signs at the construction site

- *Disturbances from traffic movement*

Construction of the proposed pipeline and ground level reservoir will require a large-scale transport operation due to the delivery of materials and construction workers to and from the site. Although no information is yet available on the number of vehicles that will be required, based on the experience of other similar projects, there will be a frequent movement of vehicles during the construction period. Therefore, normal traffic movement, especially in the vicinity of the construction site and on the C34 road will be disrupted during the construction period.

Impact Type	**Ratings (before mitigation/measures)**				**Significance**	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	*2*	*1*	*2*	*3*	*8*	*6*

Mitigation:

The contractor must erect construction signage at the construction site. Construction vehicles must be driven by authorized drivers only and stick to the authorized speed limits in urban areas. Heavy-duty vehicles and machinery must be tagged with reflective signs or tapes to maximize visibility and avoid accidents.

- *Migrant construction workers and danger of HIV/AIDS and COVID-19*

Temporary construction activities may cause an influx of people from different parts of the country in search of employment opportunities. Migrant construction workers are likely to engage in casual relationships with locals. This will result in unplanned pregnancies and may contribute to the spread of HIV/AIDS, especially among youth and school children. Moreover, the movement of people from other parts of the country will contribute to the spread of the latest pandemic of COVID-19.

Impact Type	**Ratings (before mitigation/measures)**				**Significance**	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	*2*	*2*	*1*	*2*	*7*	*5*

Mitigation:

- ✓ Provide health education and awareness.
- ✓ Qualified local people should be given priority.
- ✓ Enforce Public Health COVID-19 General Regulations: Public and Environmental Health Act 2015 as amended.
- ✓ Regular health check-ups
- ✓ Non-local employees should be returned to their original residential areas after completion of the contract.

- *Safety and health hazards*

Occupational health hazards are expected particularly about 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. The safety of the public may also be compromised by certain construction activities i.e., uncovered trenches, increase in traffic volume generation of dust, noise, and vibration.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	*1*	*1*	*1*	*2*	*5*	*3*

Mitigation:

- ✓ Employees must be provided with PPE.
- ✓ Employees must also be trained on the nature of their jobs and made aware of potential hazards at their workplace.
- ✓ Ensure that, there is a safety representative who is equipped with a first aid kit at the construction site.
- ✓ The construction site must be barricaded and out of bounds for the public and visitors.

- *Impacts of temporary construction camps, workshops and accommodation for construction workers*

Improper positioning of construction camps and workshops could result in several environmental impacts such as pollution and contamination of the soil from spills and leaks of oil and lubricants. Placing construction camps and workshops next to residential areas could result in a nuisance to the residents.

Impact Type	Ratings (before mitigation/measures)				Significance	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	*1*	*1*	*1*	*2*	*5*	*3*

Mitigation:

- ✓ It is recommended that Erf 419 located in town should be used for the establishment of construction camps and workshops as it is already containing a compacted surface and is large enough. However, Approval must be obtained for the Municipality.
- ✓ If for some reason other sites are considered, such sites must have impervious surfaces in line with Section 183 of the General Health Regulations (GN. 121 1969) and must be approved by the Municipality's Environmental Health Practitioner (EHP).
- ✓ All construction camps must be equipped with ablution facilities, including showers and a water closet with running water. The recommended ratio for toilets is 2 toilets for every 25 adults for separate for male and female as per the General Health Regulations (GN. 121 1969).
- ✓ The floor of the maintenance workshop should be covered with industrial mats to contain oil and grease from vehicles and equipment servicing.

- ✓ All operations should be limited to daylight and music played should not be at the discomfort of the neighbours.
- ✓ No alcohol may be permitted in the construction camps and workshops.
- ✓ Fireplaces should be properly secured and controlled

- *Landscape and visual/aesthetic impacts*

Visual impacts associated with the construction of the pipeline will occur because of the uncollected waste stockpile, unpacked construction materials, open trenches, and other facilities which makes the view of the site unappealing.

Impact Type	**Ratings (before mitigation/measures)**				**Significance**	
	Extent	Duration	Intensity	Probability	Without measures	With measures
Negative	*2*	*1*	*1*	*2*	*6*	*4*

Mitigation:

- ✓ Only excavate trenches in small sections, enough to be worked for a short period i.e., a week.
- ✓ Uncovered trenches should be barricaded with danger tapes to ensure public safety.
- ✓ The stripped topsoil must be backfilled carefully in position after the completion of the pipe laying.
- ✓ Waste generated should be collected and disposed of weekly. Excess sand from trenches should be regarded as waste.
- ✓ Construction materials should be properly stacked in one place.
- ✓ The construction area and construction camps and workshops should be kept neat as far as possible.

8.4 Anticipated negative impacts: operation and maintenance phase.

The operation and maintenance phase of the proposed pipeline and ground level reservoir will equally result in several negative impacts to the biophysical and socio-economic environment. These impacts are not expected to be of high significance provided that the proposed mitigation measures are implemented during the planning & design and construction phase.

ASPECT	POTENTIAL IMPACTS	SIGNIFICANCE RATING (BEFORE MITIGATION)				SIGNIFICANCE (WITH MEASURES)	MEASURES
		Extent	Duration	Intensity	Probability		
1. BIOPHYSICAL	Disturbance to local flora and fauna as a result of vehicle movement and off-road driving.	1	1	1	1	4	✓ The entire study area will be fully developed in future, therefore the impact on flora and fauna will be negligible. ✓ Existing maintenance roads should be used as far as possible. ✓ All vehicles should be driven at a minimum speed limit of 40km/hr. within the Dorob National Park and 60km/hr. in town.
	Soil disturbances and contamination from spills and leaks.	1	1	1	1	4	✓ Soil disturbance from this activity is expected to be minimal. ✓ Contaminated soil must be cleaned up and disposed of at the Walvis Bay landfill site.

	Dust and air pollution	2	1	1	1	4	✓ Maintenance and repair will be concessionary, hence the limited impacts.
	Waste generation	2	1	1	1	5	✓ General household waste should be disposed of in the municipal refuse bins for disposal. ✓ Worn-out parts should be collected and sent to the local scrap yards in Henties Bay, Swakopmund, or Walvis Bay. ✓ All empty disinfectants containers should be sent to the local 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 Walvis Bay landfill site.
	Disturbance to the hydrology of the Omaruru River.	1	1	1	1	4	✓ There will be no disturbance as the pipeline will be buried. ✓ All trenches excavated during pipeline maintenance must be filled properly, and the area must be levelled.

	Groundwater contamination from spillages	1	1	1	1	4	✓ Contaminated soil must be removed and sent to the Walvis Bay landfill site. ✓ No refuelling or fuel storage should be permitted within the Omaruru Riverbank.
2. SOCIO-ECONOMIC	Land-use effects i.e., disturbances from traffic movement.	1	1	1	1	4	✓ Use existing maintenance roads as far as possible ✓ No off-road driving should be allowed. All vehicles should be driven on a minimum speed limit of 40km/hr. within the Dorob National Park and 60km/hr., in town.
	Safety, security, and health hazards.	1	1	1	1	4	✓ Employees should be equipped with appropriate PPE. ✓ Uncovered trenches must be barricaded with a danger tape.
	Visual impacts	1	1	1	1	4	✓ Backfill all trenches/excavations ✓ Waste generated should be collected and disposed of regularly.

8.5 Anticipated positive impacts.

The proposed development will also result in several positive impacts during the construction and operation phases. However, certain enhancement measures must be implemented to fully realize such positive impacts. These impacts are as follows.

ASPECT	POTENTIAL IMPACTS	SIGNIFICANCE RATING (BEFORE MITIGATION)				SIGNIFICANCE (WITH MEASURES)	MEASURES
		Extent	Duration	Intensity	Probability		
1.	**Job opportunities** The proposed project will create job opportunities both direct and indirect for local people in technical and non-technical fields such as civil, electrical, mechanical, security, etc., especially during the construction phase.	2	1	2	2	7	✓ As part of the tender requirements, Contractors must be encouraged to give priority to locally qualified people.
	Gender roles Equal opportunities for men and women.	2	1	1	1	5	✓ Women must be given the same opportunities as men.
	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 street vendors will also benefit indirectly from the construction works.	2	1	2	2	7	✓ Building materials must be sourced from local businesses as far as possible. Qualified Namibian construction companies should be given a fair chance to compete in the bidding process.

	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. Furthermore, the improved water security will contribute to the growth of the local economy by attracting investments and development in the area.	1	1	1	1	4	✓ Local people and businesses must be given a fair chance to benefit from the project. ✓ There must be a water demand management plan for the area and all major economic activities proposed in the area should be subjected to the water demand management plan.
	Provision of water supply One of the significant positive impacts that will result from the proposed project is the improved water supply to the area. Hence, the increased supply capacity will ensure a reliable supply of safe drinking water to the Henties Bay town. However, on the other hand, the increased water supply due to the demand will put the source (Omdel Westfield) under pressure if not properly managed.	2	1	1	1	4	✓ The capacity of the new HWSS is based on the current and projected future demand of the town which took cognizance of factors such as population growth, urbanization, economic and social development of the supply area. ✓ Ensure timely fixing of leaks and breaks on the pipeline to minimise water supply interruptions. ✓ Residents must be sensitised to use water sparingly.

8.6 Decommissioning phase

8.6.1 Decommissioning of the existing supply pipeline

Once the new pipeline has been commissioned, the old pipeline will be decommissioned, and a switchover will be done without causing any interruption of the water supply. The typical ways to decommission pipelines are dismantling and local decommissioning. Local decommissioning entails the process of pigging, segmenting, plugging, and filling pipelines. The other decommissioning option is to leave it (pipe) in the ground.

a) Abandoning of pipeline in the ground

The option of whether to leave the existing pipeline in the ground or to remove it depends largely on the nature of the affected environment and future land use. The section of the existing pipeline from Omdel off-take to the C34 road measuring 2.5 km, consisting of 160mm uPVC and 150mm steel pipes should not be removed but instead, should be left in the ground. Although this section is located within the townlands, it is outside the built-up area and not necessarily within the expansion zone of the town. Leaving the pipeline in the ground will minimize disturbance to the surrounding environment and will also be costly for the proponent

However, a servitude should be registered for the section of the abandoned pipe. Additionally, the abandoned pipeline route should be marked by means of beckons to safeguard future developments from building on top of the pipeline.

b) Demolition of the pipeline section

The section of the existing pipeline from the C34 to the existing bulk water storage facilities in town, which is made up of 4.04 km C6 (150mm) AC pipes runs through the extended portion of the existing Municipal cemetery, and in proximity of the private properties as indicated in Figure 7. Hence, a discussion on whether to leave this section of the pipeline *in situ* or to remove it, is still ongoing between NamWater and the Henties Bay Municipality.

Should it be decided that the pipeline section should be removed, the removal should be done by a specialised team/contractor approved by the Ministry of Labour and Employees Relations. The removal of the AC pipe should follow the detailed procedures outlined in the EMP. Potential impacts that could emanate from the removal and mitigations measures are listed in the table below.

Table 11: Potential impacts of exhumation of the section of the existing AC pipeline

Potential Impacts	Ratings (before mitigation/measures)				Significance		Mitigation measures
	Extent	Duration	Intensity	Probability	Without measures	With measures	
Land-use effects The section of the pipeline from the C34 road to town is within a built-up area and passes through existing properties, hence the process of removing it will cause disturbances to the residents.	*1*	*1*	*1*	*1*	*4*	*2*	✓ Residents should be informed in advance about the proposed works. ✓ Erect warning signs along with the worksite. ✓ Only excavate trenches section by section and do not leave trenches open for too long. ✓ Uncovered trenches should be barricaded with reflective danger tapes.
Nuisance Dust, Noise, and Vibration to be generated from excavations and demolishing works.	*2*	*1*	*1*	*2*	*6*	*4*	✓ Work should be limited to daytime and no working during odd hours. ✓ Control dust generation
Generation of Hazardous substance The section to be removed is made of AC pipes which is hazardous. These AC pipes are 53 years, meaning they have become friable, or easily crumbled, and a hazard posing health and environmental impacts.	*2*	*1*	*1*	*2*	*6*	*4*	✓ AC waste should be handled by the approved Contractor

Waste generation The process of demolishing the pipeline will also generate other types of general waste i.e., waste rocks, excess sand, debris, etc.	*2*	*1*	*2*	*2*	*7*	*5*	✓ All general waste should be collected and disposed of at the Henties Bay dumpsite.
Soil contamination Contamination could result from spills and leaks of lubricants and oil from vehicles, machinery, and equipment.	*1*	*1*	*1*	*1*	*4*	*2*	✓ Contaminated soil should be collected and disposed of at the Walvis Bay landfill site
Safety and health hazards The safety of residents living in the proximity of the site and the employees could be compromised by workplace hazards.	*2*	*1*	*1*	*1*	*5*	*2*	✓ All employees should be equipped with appropriate PPE ✓ The site should be fenced off and out of bounds during the demolishing work.

Most of the impacts above are similar to impacts identified under Section 8.4, hence proposed mitigation measures should be implemented respectively.

8.6.2 Decommissioning the existing ground level reservoirs

Once the new HWSS has been implemented, the existing two ground level reservoirs will become obsolete. It is not clear at this stage whether the existing ground level reservoirs will be demolished or not. From the waste minimization perspective as well as for cost-saving purposes, it will not be ideal to demolish the existing infrastructure but rather to extend their service life span.

Should the Henties Bay Municipality or NamWater decides not to demolish this infrastructure and continue to make use of them, a structure study should be commissioned to establish the structure form and stability of the structures. Moreover, extensive repairs will have to be executed before they can be utilized.

Table 12: Potential impacts of keeping the existing reservoir (if not used)

Potential Impacts	Ratings (before mitigation/measures)				Significance		Mitigation measures
	Extent	Duration	Intensity	Probability	Without measures	With measures	
Risk of collapsing Although the existing ground level reservoir is still functioning, they have been severely affected by the coastal environment resulting in the rusting of the reinforcing steel, which in turn has caused concrete spalling and exposure of rusted steel in places. The structure can deteriorate over time and if not maintained correctly, can go on to fail.	*1*	*1*	*1*	*1*	*4*	*2*	✓ According to NamWater Civil Engineering Department, the risk that the ground level reservoir could collapse is very minimal and unlikely in the foreseeable future. ✓ However, NamWater should appoint a qualified Civil Engineer to determine the structural stability and life span of the infrastructure. ✓ Repair and refurbishment of certain components/parts of the infrastructure mighty also be necessary if the structures are to be kept for the unforeseeable future.

Public safety risks Keeping the existing ground level reservoirs while not in use mighty pose serious public health and safety issues as the infrastructure might harbour disease-carrying pathogens i.e., rodents, birds, snakes, etc. Unused infrastructure might also be a hiding place for criminals if not properly secured.	*2*	*1*	*1*	*1*	*5*	*3*	✓ Repair and refurbishment of certain components/parts of the infrastructure mighty also be necessary if the structures are to be kept for the unforeseeable future. ✓ All openings to the building should be closed/sealed properly. ✓ Access to the infrastructure should be restricted.
Visual/Aesthetic impacts If the existing infrastructure is kept for many years without any repair, it will dilapidate and may become an eyesore.	*1*	*1*	*1*	*1*	*4*	*2*	✓ Repair and refurbishment of certain components/parts of the infrastructure mighty also be necessary if the structures are to be kept for the unforeseeable future. ✓ Remove all unwanted structures and always keep the area neat. ✓ NamWater in consultation with the Municipality should take an informed decision whether to keep the structure or not as soon as possible.

However, should it be decided immediately that the two existing ground level reservoirs will be demolished, several environmental impacts are expected to occur as a result of structural demolishment as follows.

Table 13: Potential impacts of demolishing the existing reservoirs

Potential Impacts	Ratings (before mitigation/measures)				Significance		Mitigation measures
	Extent	Duration	Intensity	Probability	Without measures	With measures	
Land-use effects The existing ground level reservoirs are located within a built-up area, hence demolishing them will cause disturbances to the neighbouring residents.	*2*	*1*	*2*	*2*	*7*	*5*	✓ Residents should be informed in advance about the proposed works. ✓ Erect warning signs at the worksite. ✓ Work should be limited to daytime hours.
Dust, Noise, and Vibration To be generated from demolishing works	*1*	*1*	*2*	*2*	*6*	*4*	✓ The site must be fenced off before commencement of work. ✓ Work should be limited to daytime hours.
Waste generation The structural demolishment of the existing reservoirs will generate a huge amount of waste.	*2*	*1*	*1*	*2*	*7*	*5*	✓ Building rubble and other general waste should be disposed of at the Henties Bay dumpsite ✓ Hazardous waste i.e., AC materials should be handled by an approved contractor and disposed of at the Walvis Bay landfill site.

							✓ Steel and metals should be taken to local Scrapyards in Henties Bay or Swakopmund i.e., Scrap Salvage.
Soil contamination from spills and leaks of lubricants and oil from vehicles, machinery, and equipment.	*1*	*1*	*1*	*2*	*5*	*3*	✓ All Vehicles and Machinery with leaks should be provided with drip trays. ✓ Contaminated sand must be cleaned up and disposed of at the Walvis Bay landfill site.
Safety and health hazards The safety of residents living in the neighbourhood of the site and the employees could be compromised by workplace hazards.	*2*	*1*	*1*	*1*	*6*	*4*	✓ Erect warning signs at the construction work site. ✓ The site should be fenced off and out of bound. ✓ All employees should be equipped with PPE ✓ Any material containing AC should be handed by approved contractors and disposed of at the Walvis Bay landfill site.

Most of the impacts above are similar to impacts identified under Section 8.4, hence proposed mitigation measures should be implemented respectively.

9. CONCLUSION AND RECOMMENDATIONS

9.1 Conclusion

The objective of the Scoping phase of the EIA study was to define the range of the environmental impact assessment and to determine the need to conduct any specialist study. It is believed that this objective has been achieved and the study can be concluded at the Scoping level. The following conclusions have been made from this study:

- The current HWSS is facing challenges to meet the current and future demand due to aging infrastructure and limited supply and storage capacities, hence the need for replacement.
- The existing HWSS will be replaced with a completely new scheme consisting of a NamWater controlled scheme and Henties Bay Municipality controlled scheme as presented in Figure 11.
- The proposed new scheme will entail the replacement of the existing supply pipeline with a new pipeline covering approximately 5,622 m following the alternative route 1 (Figure 7) and construction of a new ground level reservoir with a capacity of 5000 m^3 to be located at Alternative site 1 (Figure 10).
- The new pipeline will be rerouted away from the fence of the NYS centre and will cross the C34 road under the existing culvert.
- As per their commitment letter hereto attached as Appendix E, The Henties Bay Municipality will allocate the site for the construction of a new ground level reservoir to NamWater free of charge.
- Once the new pipeline has been commissioned, the old pipeline will be decommissioned, and a switchover will be done without causing any interruption of the water supply.

Moreover, all possible environmental aspects associated with the proposed activities have been adequately assessed and documented in the Scoping Report. Hence, there is no need for a specialist study. Since there were no objections received from the I&APs or stakeholders, it is assumed that the proposed project is well received by all. All necessary control, mitigation and monitoring measures have been formulated to meet statutory requirements and are contained in this Scoping report and the EMP (Annexure F).

9.2 EAP recommendations

a) Recommendations to the proponent (NamWater)

- NamWater should liaise with Henties Bay Municipality to apply town planning procedures on the proposed development site for the new ground level reservoir (subdivision and rezoning).
- NamWater should apply with Erongo RED for power supply to the new ground level site.
- A Geotechnical Investigation should be undertaken on the new ground level reservoir site and recommendations thereof should be adhered to.
- The section of the existing pipeline from Omdel off-take to the C34 road should not be removed but should instead be left in the ground to minimize disturbance to the surrounding environment.
- NamWater should engage the Henties Bay Municipality regarding the section of the existing pipeline from the C34 to the existing bulk water storage facilities in town.
- NamWater should seek approval from RA for the pipeline crossing at the C34 road.

b) Recommendation to DWA and DEA

- Approve the findings of the Scoping process and mitigation measures contained in the Scoping (this report).
- When deemed necessary, attach any condition/s to ensure environmental compliance and for the proposed project to meet statutory requirements.
- Authorize the issuance of the ECC to NamWater Ltd., for the construction, operation, maintenance, and decommissioning of the proposed Henties Bay pipeline and the replacement of the Ground Level Reservoir, Henties Bay, Erongo Region.

10. REFERENCES

- Barnard P. 1998. Biological Diversity in Namibia, a countrywide study. Namibian National Biodiversity Task Force. Windhoek.
- Chivell, E. H & Crerar, S. E. 1992. Unit runoff map for Namibia. Unpublished DWA report, Windhoek.
- Department of Water Affairs., Ministry of Agriculture, Water and Rural Development, 1999.
- Digital Atlas of Namibia Unpublished Report. Ministry of Environment & Tourism.
- Directorate of Environmental Affairs, 2008. Procedures and Guidelines for Environmental Impact Assessment (EIA) and Environmental Management Plans (EMP), Directorate of Environmental Affairs, Ministry of Environment and Tourism, Windhoek.
- Mendelsohn, J., Jarvis, A., Roberts, C., & Robertson, T. 2002. Atlas of Namibia. New Africa Books (Pty) Ltd: Cape Town.
- Miller, R. McG. 2008. The Geology of Namibia, 3 Vols. Geol. Survey of Namibia, Windhoek.
- Namibia Statistic Agency, 2001, Population and Housing Census [Report]. Windhoek. 2003.
- Namibia Statistic Agency, 2016. Namibia Inter-censal Demographic Survey.
- Henties Bay Municipality (2021) retrieved from https://www.hbaymun.com.na
- NamWater, 2020., Preliminary Design Report. Henties Bay Pipeline and Ground Level Reservoir Replacement. by Nakale Angela S, August 2020.
- NamWater, 2016., Development Proposal on Bulk Water Supply to Henties Bay. Planning Division, October 2016.

11. APPENDICES

11.1 Appendix A: HWSS Sales figures 2016-2020

11.2 Appendix B: Water Consumption for Henties Bay town

11.3 Appendix C: Development Proposal for the HWSS

11.4 Appendix D: Proof of Consultations

11.5 Appendix E: Henties Bay Municipality Commitment Letter

11.6 Appendix F: EMP