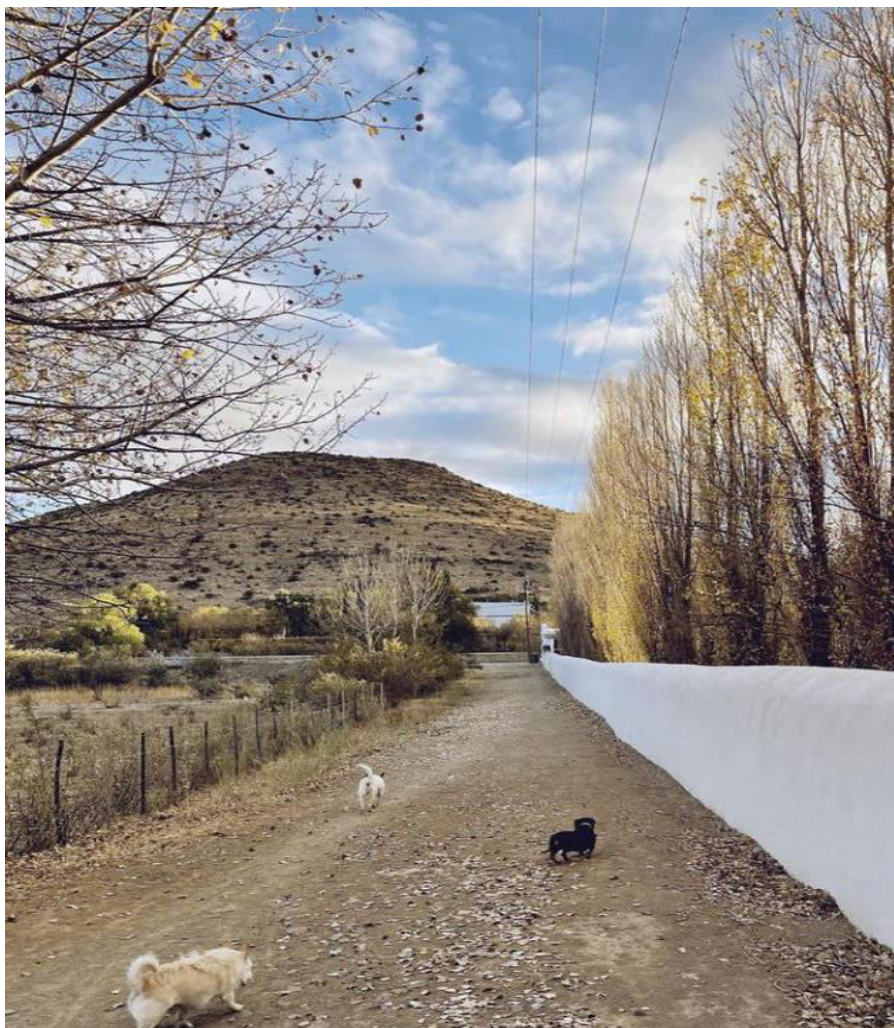


ENVIRONMENTAL SCOPING REPORT



1/25/2024

Proposed Township Establishment on Portion 111
(a Portion of Portion 39) of Consolidated Farm
Tsumore No. 761, Tsumeb, Oshikoto Region

Prepared for:

Rainy Day Thirty Seven Investments 37
(Pty) Ltd

Prepared by:



In Partnership with:



PROPONENT:

Rainy Day Investments Thirty Seven (Pty) Ltd

P.O. Box 864

Windhoek

Tel: 061 275 550

Fax: 061 238 802

Email: botha@wkh-law.com

REPORT DATE:

12 March 2024

AUTHORS:

Colin P Namene

P.O. Box 24056

Windhoek

Tel: 061 – 081 458 4297

Email: colin@environam.com

David H Uushona

P.O. Box 4291, Vineta

Swakopmund

081 122 0814

daviduushona@yahoo.com



12/03/2024

Signature

Date

TABLE OF CONTENTS

1.	INTRODUCTION.....	11
1.1.	PROJECT BACKGROUND.....	11
1.2	PROJECT LOCATION.....	12
1.3	TERMS OF REFERENCE AND SCOPE OF PROJECT.....	14
1.4	ASSUMPTIONS AND LIMITATIONS.....	14
1.5	CONTENT OF ENVIRONMENTAL SCOPING REPORT.....	14
2.	LEGAL, POLICY AND INSTITUTIONAL FRAMEWORK.....	16
3.	ENVIRONMENTAL BASELINE DESCRIPTION.....	20
3.1.	SOCIAL ENVIRONMENT.....	20
3.1.1.	SOCIO-ECONOMIC CONTEXT.....	20
3.1.2.	ARCHAEOLOGICAL AND HERITAGE CONTEXT.....	20
3.2.	BIO-PHYSICAL ENVIRONMENT.....	21
3.2.1.	CLIMATE.....	21
3.2.2.	TOPOGRAPHY, GEOLOGY AND HYDROGEOLOGY.....	23
3.2.3.	TERRESTRIAL ECOLOGY.....	25
3.3.	SURROUNDING LAND USE.....	27
3.4.	PHYSICAL ENVIRONMENT.....	27
4.	PROJECT DESCRIPTION.....	28
4.1.	PROPOSED DEVELOPMENT.....	28
4.2.	NO - GO ALTERNATIVE.....	33
5.	PUBLIC CONSULTATION PROCESS.....	33
5.1.	PUBLIC PARTICIPATION REQUIREMENTS.....	33
5.2.	PUBLIC CONSULTATION PROCESS PHASE 2.....	34
6.	ASSESSMENT METHODOLOGY.....	35
7.	MITIGATION HIERACHY.....	37
8.	POTENTIAL IMPACTS.....	38
8.1.	PLANNING AND DESIGN PHASE IMPACTS.....	39
8.1.1.	LAND USE CHANGE.....	39
8.1.2.	FAUNA AND FLORA (BIODIVERSITY).....	39
8.1.3.	EXISTING SERVICE INFRASTRUCTURE IMPACTS.....	40
8.1.4.	TRAFFIC IMPACTS.....	40
8.1.5.	HERITAGE IMPACTS.....	40
8.2.	CONSTRUCTION PHASE IMPACTS.....	40
8.2.1.	PRESSURE ON EXISTING INFRASTRUCTURE.....	41
8.2.2.	SURFACE AND GROUND WATER IMPACTS.....	41
8.2.3.	HEALTH, SAFETY AND SECURITY IMPACTS.....	41
8.2.4.	AIR QUALITY.....	41

8.2.5.NOISE IMPACTS	41
8.2.6.TRAFFIC IMPACTS.....	42
8.2.7.SOLID WASTE MANAGEMENT	42
8.2.8.STORAGE AND UTILISATION OF HAZARDOUS SUBSTANCES.....	42
8.2.9.SOCIAL IMPACTS	42
8.3. OPERATIONAL PHASE IMPACTS	42
8.3.1.SURFACE AND GROUND WATER IMPACTS	42
8.3.2.AIR QUALITY	43
8.3.3.NOISE IMPACTS	44
8.3.4.SOLID AND INDUSTRIAL WASTE	44
8.3.5.SOCIAL IMPACT	44
8.3.6.VISUAL AND SENSE OF PLACE IMPACTS	44
9. SUMMARY OF POTENTIAL IMPACTS.....	45
10. CONCLUSION AND RECOMMENDATIONS	55
10.1. CONSTRUCTION PHASE IMPACTS.....	55
10.2. OPERATIONAL PHASE.....	55
10.3. LEVEL OF CONFIDENCE IN ASSESSMENT	55
10.4. MITIGATION MEASURES	55
10.5. OPINION WITH RESPECT TO THE ENVIRONMENTAL AUTHORISATION	56
11. REFERENCES	57

LIST OF FIGURES

Figure 1: Locality map of Tsumeb	12
Figure 2: Locality map of the site	13
Figure 3: EIA Flowchart for Namibia (Environmental Assessment Policy of 1995)	19
Figure 4: Average monthly temperature and rainfall for Tsumeb (Climate-data, 2024)	22
Figure 5: Temperature graph for Tsumeb (Climate-data, 2024).....	23
Figure 6: Hydrological map.....	25
Figure 7: General area of the proposed development site.....	26
Figure 8: Typical Village Centre Character.....	29
Figure 9: Typical Hamlet Character.....	29
Figure 10: Typical Single Dwelling Character	30
Figure 11: Typical Parkland and Wilderness Character.....	30
Figure 12: Typical Natural Specialist District Industrial Character	31
Figure 13: Tsumeb Village Concept Site Development Plan	32
Figure 14: Mitigation Hierarchy	37

LIST OF TABLES

Table 1: Contents of the Scoping / Environmental Assessment Report	14
Table 2: Legislation applicable to the proposed development.....	16
Table 3: Statistics of Tsumeb Constituency.....	20
Table 4: Declared Heritage Sites (NHCN, 2016).....	21

Table 5: Climatic data (Mendelsohn et al., 2003).....	22
Table 6: Species diversity (Mendelsohn et al., 2003)	25
Table 7: Table of Public Participation Activities	33
Table 8: Main issues received during the public participation process.....	34
Table 9: Impact Assessment Criteria	35
Table 10: WHO Air Quality Guidelines (WHO, 2016)	43
Table 11: Overview of potential impacts	46
Table 12: Proposed mitigation measures for the planning and design phase	48
Table 13: Proposed mitigation measures for the construction phase	49
Table 14: Proposed mitigation measures for the operational phase	52

LIST OF ANNEXURES

Annexure A:	Proof of Site Notices/ Posters
Annexure B:	Proof of advertisements
Annexure C:	Photo Plates
Annexure D:	Public Participation process
	1) I&AP database & Registered List
	2) Notification letters sent of BID
	3) Public Meeting Presentation
	4) Public Meeting Attendance Register
	5) Comments received (Phase 1)
	6) Notification sent of DESR
	Comments Received of DESR
Annexure E:	Curriculum vitae of Environmental Assessment Practitioner
Annexure F:	Environmental Management Plan

LIST OF ACRONYMS

AIDS	Acquired immune deficiency syndrome
CRR	Comments and response report
dB	Decibels
DESR	Draft Environmental Scoping Report
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
EAR	Environmental Assessment Report
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
GTZ	Gesellschaft für Technische Zusammenarbeit
HIV	Human immunodeficiency virus
I&AP	Interested and Affected Party
IUCN	International Union for Conservation of Nature
MET	Ministry of Environment and Tourism
MET: DEA	Ministry of Environment and Tourism: Department of Environmental Affairs
MURD	Ministry of Urban and Rural Development
MWTC	Ministry of Works Transport and Communication
PPP	Public participation process
p/km ²	People per square kilometre
SADC	Southern African Development Community
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

1 INTRODUCTION AND BACKGROUND

Urbanization and its impact on quality of life (or lack thereof) are two of the biggest challenges we face globally. Increasing urbanization has severe economic and social consequences for our society. Among them are overpopulation, pollution, inadequate infrastructure and overuse of natural resources, as well as rising property values and living costs.

Urban planning has failed to accommodate a large influx of people, resulting in sprawling communities within the urban edge. In the end, large residential neighbourhoods with no sense of place and a low quality of life are the result.

Establishing contemporary mixed land use urban villages is one solution to address the negative impacts of urbanization. In these villages, residents live a life in harmony with nature, minimizing consumption and making maximum use of resources for the best and healthiest lifestyle possible. Smaller mixed land use urban village settlements relieve cities' resources and infrastructure of the strain placed on them. The solution here is to bring back an age-old concept of living close to fertile agricultural land to supply fresh food daily, along with open, green spaces for recreation and well-being.

Rainy Day Investments Thirty-Seven (Pty) Ltd (the proponent) has obtained Portion 111 (a Portion of Portion 39) of Consolidated Farm Tsumore No. 761, Tsumeb, Oshikoto Region. Accordingly, the above-mentioned property offers an excellent opportunity to establish a new mixed land use village that will significantly enhance the broad strategic and development objectives of the Tsumeb Municipality in line with the Tsumeb Structure Plan.

Located south west of Tsumeb, the proposed development site is connected to the town by the B1. It is intended to augment the natural, rural Namibian landscape and use it as a guide for the design process of the site, capitalising on the rural character of the site.

The goal is to create an enduring development that imposes little service burden on the Tsumeb Local Municipality. The Tsumeb Local Municipality will thus not be required to invest in infrastructure or provide services (sewer, water, and power) for this proposed development.

The above activities are discussed in more detail in Chapter 4. The proponent appointed SED Consultancy in partnership with Environam Consultants Trading cc (ECT) to undertake the Environmental Assessment (EA) in order to obtain an Environmental Clearance Certificate (ECC) for the activities. The Ministry of Environment and Tourism: Department of Environmental Affairs (MET: DEA) is the competent environmental authority.

The process will be undertaken in terms of the gazetted Namibian Government Notice No. 30 Environmental Impact Assessment Regulations (herein referred to as EIA Regulations) of the Environmental Management Act (No 7 of 2007) (herein referred to as the EMA). The EA

process will investigate if there are any potential significant bio-physical and socio-economic impacts associated with the proposed development and related infrastructure and services. The EIA process also provides an opportunity for the public and key stakeholders to submit comments and participate in the process, it will also serve the purpose of informing the proponent's decision-making as well as that of the Ministry of Environment and Tourism through the Office of the Environmental Commissioner.

1.1 PROJECT LOCATION

The proposed development site is located to the southwest of Tsumeb, with the B1 passing between the town and the site. The property is on centre coordinates: -19.251798°, 17.672800° Adjacent east lies Portion 57 of Consolidated Farm Tsumore No. 761, Portion 39/761 to the south with Portions 38/761 and 34/761 respectively north and south.

2 LEGISLATIVE FRAMEWORK

The principle environmental regulatory agency in Namibia is the Office of the Environmental Commissioner within the Directorate of Environmental Affairs of the Ministry of Environment, Forestry and Tourism. Most of the policies and legislative instruments have their basis in two clauses of the Namibian Constitution, i.e. Article 91 (c) and Article 95 (I); however, good environmental management finds recourse in multiple legal instruments. Table 2 provides a summary of the legal framework considered to be relevant to this development and the environmental assessment process.

3 ENGINEERING SERVICES

The infrastructure needs of the proposed project can be categorised into two broad classifications namely:

- Basic infrastructure that includes electricity and roads.
- Environmental infrastructure that consists of water supply, sewage and drainage systems, solid waste management and landscaping.

The service infrastructure such as water, sewer, drainage, electricity and roads will be designed by registered professional engineers to integrate with the existing build-up area of Tsumeb. These will be carried out in consultation with the Municipality as the relevant authority.

There are two possible access intersections to the proposed project site, however both will need to be upgraded in order to comply with Roads Authority standards. The Tsumeb Municipality confirmed that either gravel or surfaced roads will suffice in terms of standard of service expectations.

4 PUBLIC PARTICIPATION PROCESS

Regulation 21 of the EIA Regulations makes provision for conducting a public consultation process as part of the EA process. This entails participatory consultation with members of

the public by providing an opportunity to comment on the proposed project. The Public Consultation process has thus incorporated the requirements of Namibia's legislation, and also takes account of national and international best practises. Please see Table 7 for the activities undertaken as part of the public participation process. The comment period of the initial public participation process commenced on 23 November 2023 and ended on 14 December 2023

The second phase of the Public Consultation Process involves lodging of the Draft Scoping Report (DSR) to all registered I&AP for comment. Registered and potential I&APs are informed of the availability of the DSR for public comment via communication dated 09 February 2024. An Executive Summary of the DSR is included in the communication going out to the registered I&APs. I&APs are given time until 23 February 2024 to submit comments or raise any issues or concerns they may have with regard to the proposed project.

POTENTIAL IMPACTS IDENTIFIED

The following planning and design phase impacts were identified:

- Land use change;
- Fauna and flora;
- Existing infrastructure;
- Heritage sites

The following construction phase impacts were identified:

- Pressure on the existing infrastructure;
- Surface and groundwater;
- Health, safety and security;
- Air quality,
- Noise pollution,
- Traffic;
- Waste management;
- Hazardous substances;
- and social impact.

The following operational phase impacts were identified:

- Surface and ground water;
- Air quality;
- Noise;
- Waste management;
- Infrastructure;
- Quality of life;
- And Visual impact.

5 CONCLUSION

The establishment of the township is seen as an improvement on the current status of the town's development. From a social perspective, the provision of municipal services and township development is highly important for the community to enhance their livelihoods and in turn also uplift the general economy of the town. These factors will in turn also have a positive impact on the quality of life of the residents both in terms of health and household incomes.

During the operational phase the impacts of surface and ground water; air quality; noise; and waste management were assessed to have a long-term negative effect without mitigation. The impacts will however be significantly reduced when the recommended mitigation measures in the scoping report and environmental management plan (EMP) are implemented.

Based on the evidence produced during the assessment process, it is very unlikely that this project will have any significant negative impacts on the environment. It is therefore recommended that a clearance certificate be issued for the project.

1. INTRODUCTION

1.1. Project Background

Urbanization and its impact on quality of life (or lack thereof) are two of the biggest challenges we face globally. Increasing urbanization has severe economic and social consequences for our society. Among them are overpopulation, pollution, inadequate infrastructure and overuse of natural resources, as well as rising property values and living costs.

Urban planning has failed to accommodate a large influx of people, resulting in sprawling communities within the urban edge. In the end, large residential neighbourhoods with no sense of place and a low quality of life are the result.

Establishing contemporary mixed land use urban villages is one solution to address the negative impacts of urbanization. In these villages, residents live a life in harmony with nature, minimizing consumption and making maximum use of resources for the best and healthiest lifestyle possible. Smaller mixed land use urban village settlements relieve cities' resources and infrastructure of the strain placed on them. The solution here is to bring back an age-old concept of living close to fertile agricultural land to supply fresh food daily, along with open, green spaces for recreation and well-being.

Rainy Day Investments Thirty-Seven (Pty) Ltd (the proponent) has obtained Portion 111 (a Portion of Portion 39) of Consolidated Farm Tsumore No. 761, Tsumeb, Oshikoto Region. Accordingly, the above-mentioned property offers an excellent opportunity to establish a new mixed land use village that will significantly enhance the broad strategic and development objectives of the Tsumeb Municipality in line with the Tsumeb Structure Plan.

Located south west of Tsumeb, the proposed development site is connected to the town by the B1. It is intended to augment the natural, rural Namibian landscape and use it as a guide for the design process of the site, capitalising on the rural character of the site.

The goal is to create an enduring development that imposes little service burden on the Tsumeb Local Municipality. The Tsumeb Local Municipality will thus not be required to invest in infrastructure or provide services (sewer, water, and power) for this proposed development.

The above activities are discussed in more detail in Chapter 4. The proponent appointed SED Consultancy in partnership with Environam Consultants Trading cc (ECT) to undertake the Environmental Assessment (EA) in order to obtain an Environmental Clearance Certificate (ECC) for the activities. The Ministry of Environment and Tourism: Department of Environmental Affairs (MET: DEA) is the competent environmental authority.

The process will be undertaken in terms of the gazetted Namibian Government Notice No. 30 Environmental Impact Assessment Regulations (herein referred to as EIA Regulations) of the

Environmental Management Act (No 7 of 2007) (herein referred to as the EMA). The EA process will investigate if there are any potential significant bio-physical and socio-economic impacts associated with the proposed development and related infrastructure and services. The EIA process also provides an opportunity for the public and key stakeholders to submit comments and participate in the process, it will also serve the purpose of informing the proponent's decision-making as well as that of the Ministry of Environment and Tourism through the Office of the Environmental Commissioner.

1.2 Project Location

The proposed development site is located to the southwest of Tsumeb, with the B1 passing between the town and the site. The property is on centre coordinates: -19.251798° , 17.672800° . Adjacent east lies Portion 57 of Consolidated Farm Tsumore No. 761, Portion 39/761 to the south with Portions 38/761 and 34/761 respectively north and south. See Figures 1 and 2 below for the locality maps of Tsumeb, and the site.



Figure 1: Locality map of Tsumeb

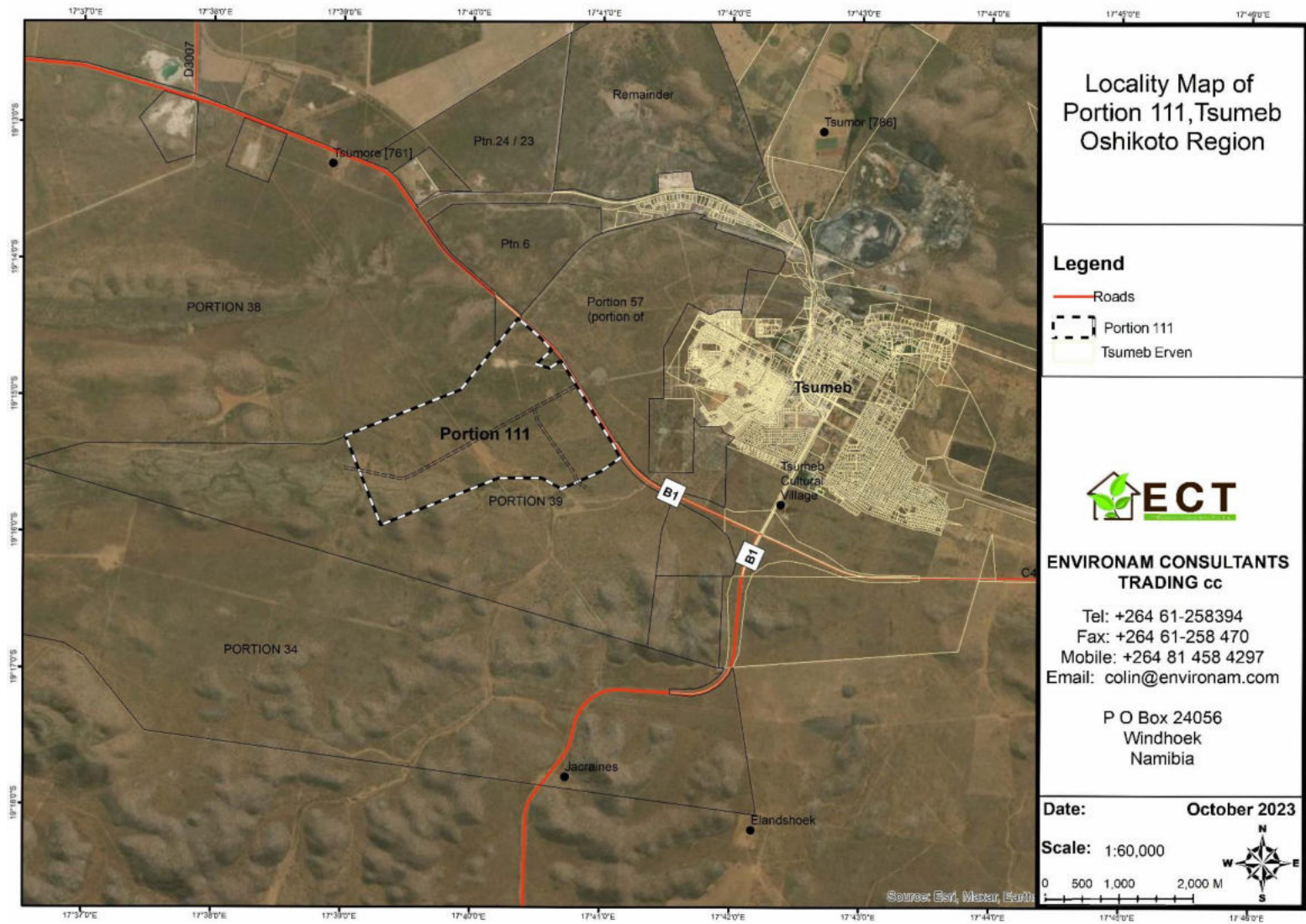


Figure 2: Locality map of the site

1.3 Terms of Reference and Scope of Project

The scope of this project is limited to conducting an environmental impact assessment and applying for an Environmental Clearance Certificate for the Proposed Township Establishment on Portion 111 (a Portion of Portion 39) of Consolidated Farm Tsumore No. 761, Tsumeb and associated infrastructure as indicated in section 1.1 above. This includes consultations with client; site investigations and analysis; stakeholder consultations including a public meeting; impact analysis; mitigation formulation; report writing; and draft Environmental Management Plan.

1.4 Assumptions and Limitations

In undertaking this investigation and compiling the Environmental Assessment, the following assumptions and limitations apply:

- Assumes the information provided by the proponent is accurate and discloses all information available.
- Various layout alternatives were initially considered by the proponent, having taken due regard of the natural and environmental constraints, and the unique character and appeal of Tsumeb. The current designs present the most feasible results.

1.5 Content of Environmental Scoping Report

In terms of Section 8 of the gazetted EIA Regulations a Scoping Report must include specified content. **Table 1** below delineate, for the purpose of ease reference, where this content is found in this Scoping Report.

Table 1: Contents of the Scoping / Environmental Assessment Report

Section	Description	Section of ESR/ Annexure
8 (a)	The curriculum vitae of the EAPs who prepared the report;	Refer to Annexure E
8 (b)	A description of the proposed activity;	Refer to Chapter 4
8 (c)	A description of the site on which the activity is to be undertaken and the location of the activity on the site;	Refer to Chapter 3
8 (d)	A description of the environment that may be affected by the proposed activity and the manner in which the geographical, physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed listed activity;	Refer to Chapter 3
8 (e)	An identification of laws and guidelines that have been considered in the preparation of the scoping report;	Refer to Chapter 2

Section	Description	Section of ESR/ Annexure
8 (f)	Details of the public consultation process conducted in terms of regulation 7(1) in connection with the application, including	Refer to Chapter 5
	(i) the steps that were taken to notify potentially interested and affected parties of the proposed application	Refer to Chapter 5
	(ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed or given;	Refer to Annexures A and B for site notices and advertisements respectively.
	(iii) a list of all persons, organisations and organs of state that were registered in terms of regulation 22 as interested and affected parties in relation to the application;	Refer to Annexure D
	(iv) a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues;	Refer to Annexure D
8 (g)	A description of the need and desirability of the proposed listed activity and any identified alternatives to the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed activity or alternatives have on the environment and on the community that may be affected by the activity;	Refer to Chapter 4
8 (h)	A description and assessment of the significance of any significant effects, including cumulative effects, that may occur as a result of the undertaking of the activity or identified alternatives or as a result of any construction, erection or decommissioning associated with the undertaking of the proposed listed activity;	Refer to Chapter 7
8 (i)	terms of reference for the detailed assessment;	Refer to Chapter 1
8 (j)	An environmental management plan	Refer to Annexure F

2. LEGAL, POLICY AND INSTITUTIONAL FRAMEWORK

The principle environmental regulatory agency in Namibia is the Office of the Environmental Commissioner in the Directorate of Environmental Affairs of the Ministry of Environmental and Tourism. Most of the policies and legislative instruments have their basis in two clauses of the Namibian Constitution, i.e. Article 91 (c) and Article 95 (l). However, good environmental management finds recourse in multiple legal instruments. Table 2 below provides a summary of the legal framework considered to be relevant to this development and the environmental assessment process.

Table 2: Legislation applicable to the proposed development

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
The Constitution of the Republic of Namibia as Amended	Article 91 (c) provides for duty to guard against “the degradation and destruction of ecosystems and failure to protect the beauty and character of Namibia.” Article 95(l) deals with the “maintenance of ecosystems, essential ecological processes and biological diversity” and sustainable use of the country’s natural resources.	Sustainable development should be at the forefront of this development.
Environmental Management Act No. 7 of 2007 (EMA)	Section 2 outlines the objective of the Act and the means to achieve that. Section 3 details the principle of Environmental Management	The development should be informed by the EMA.
EIA Regulations GN 28, 29, and 30 of EMA (2012)	GN 29 Identifies and lists certain activities that cannot be undertaken without an environmental clearance certificate. GN 30 provides the regulations governing the environmental assessment (EA) process.	Activity 10.1 (a) The construction of oil, water, gas and petrochemical and other bulk supply pipelines. Activity 10.1 (b) The construction of public roads. Activity 10.2 (a) The route determination of roads and design of associated physical infrastructure where it is a public road.
Convention on Biological Diversity (1992)	Article 1 lists the conservation of biological diversity amongst the objectives of the convention.	The project should consider the impact it will have on the biodiversity of the area.
Draft Procedures and Guidelines for conducting EIAs and compiling EMPs (2008)	Part 1, Stage 8 of the guidelines states that if a proposal is likely to affect people, certain guidelines should be considered by the proponent in the scoping process.	The EA process should incorporate the aspects outlined in the guidelines.
Namibia Vision 2030	Vision 2030 states that the solitude, silence and natural beauty that	Care should be taken that the development does not lead to the

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
	many areas in Namibia provide are becoming sought after commodities and must be regarded as valuable natural assets.	degradation of the natural beauty of the area.
Water Resources Management Act 11 of 2013.	<ul style="list-style-type: none"> • A permit application in terms of Sections 72(1) of the Water Act is required for the disposal of industrial or domestic waste water and effluent. • Section 44 (1): a licence for abstraction and use of water, to be obtained from the Minister. 	<p>Obligation not to pollute surface water bodies.</p> <p>The following licences are required in terms of the Water Resources Management Act:</p> <ul style="list-style-type: none"> • Licence to abstract and use water; • Groundwater disposal licence; • Borehole licence.
The Ministry of Environment and Tourism (MET) Policy on HIV & AIDS	MET has recently developed a policy on HIV and AIDS. In addition, it has also initiated a programme aimed at mainstreaming HIV and gender issues into environmental impact assessments.	The proponent and its contractor have to 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 construction workers interact with local communities.
Urban and Regional Planning Act, 2018	The Act provides for the establishment of townships.	Section 64 defines the procedure and functionary of townships establishment.
Local Authorities Act No. 23 of 1992	The Local Authorities Act prescribes the manner in which a town or municipality should be managed by the Town or Municipal Council. Sections 34-47 make provision for the aspects of water and sewerage.	The development has to comply with the provisions of the Local Authorities Act
Labour Act no 11 of 2007	Chapter 2 details the fundamental rights and protections. Chapter 3 deals with the basic conditions of employment.	Given the employment opportunities presented by the development, compliance with the labour law is essential.
Public Health Act no 36 of 1919	Section 119 prohibits persons from causing nuisance.	Contractors and residents of the proposed extensions are to comply with these legal requirements.
Nature Conservation Ordinance no 4 of 1975	Chapter 6 provides for legislation regarding the protection of indigenous plants	Indigenous and protected plants have to be managed within the legal confines.
Atmospheric Pollution Prevention Ordinance (No. 11 of 1976).	The Ordinance objective is to provide for the prevention of the pollution of the atmosphere, and for matters incidental thereto.	All future activities on the sites will have to take due consideration of the provisions of this legislation.
Roads Ordinance 17 of 1972	This Ordinance consolidates the laws relating to roads.	The provisions of this legislation have to be taken into consideration in as far as access to the development site is concerned.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
Roads Authority Act, 1999	Section 16(5) of this Act places a duty on the Roads Authority to ensure a safe road system.	Some functions of the Roads Ordinance 17 of 1972 have been assigned to the Roads Authority.

This EA process will be undertaken in accordance with the EIA Regulations. A Flow Diagram (refer to **Figure 6** below) provides an outline of the EIA process to be followed.

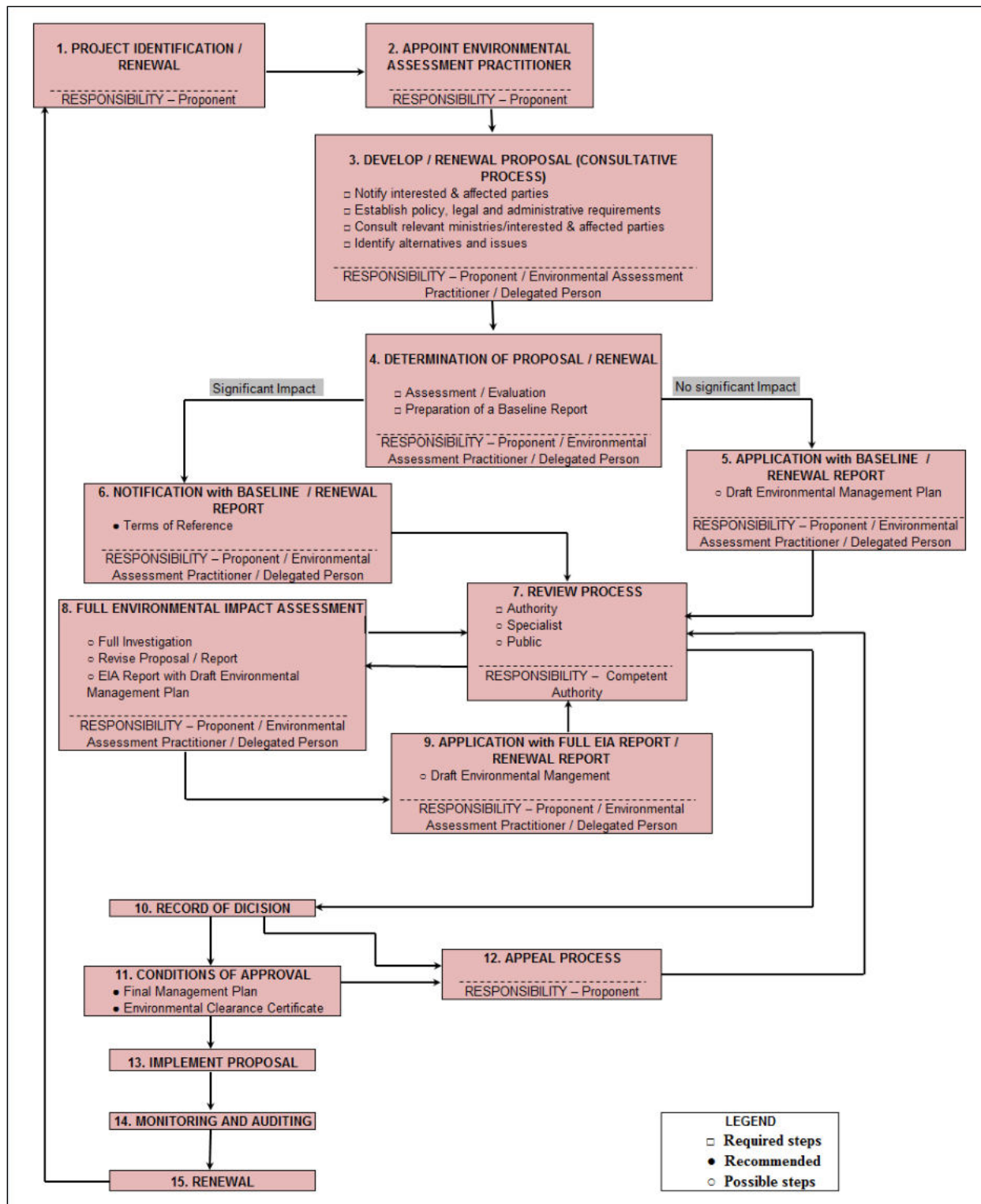


Figure 3: EIA Flowchart for Namibia (Environmental Assessment Policy of 1995)

3. ENVIRONMENTAL BASELINE DESCRIPTION

3.1. Social Environment

3.1.1. Socio-Economic Context

The statistics shown in Table 3 below are derived from the 2011 Namibia Population and Housing Census (NSA, 2011) and presented from a constituency perspective:

Table 3: Statistics of Tsumeb Constituency

TSUMEB CONSTITUENCY	
Population	19, 840
Females	9,999
Males	9,841
Private Households	4,965
Population under 5 years	12%
Population aged 5 to 14 years	21%
Population aged 15 to 59 years	62%
Population aged 60 years and above	5%
Female: male ratio	100:98
Literacy rate of 15 years old and above	89%
Head of household - Females	42%
Head of household - Males	58%
People above 15 years who have never attended school	12%
People above 15 years who are currently attending school	26%
People above 15 years who have left school	57%
People with disability	5%
People aged 15 years and up who belong to the labour force	74%
Population employed	64%
Homemakers	11%
Students	54%
Severely disabled, retired or old age income recipients	35%
Income from pension	9%
Income from business and non-farming activities	12%
Income from farming	1%
Income from cash remittance	4%
Wages and salaries	69%

3.1.2. Archaeological and Heritage Context

There are a few sites of heritage and archaeological importance within the Tsumeb area which are declared as national monuments. They are listed in Table 4 below:

Table 4: Declared Heritage Sites (NHCN, 2016)

Site Name	Site Type	General Information
Otjikoto Lake	Underwater	<ul style="list-style-type: none"> Lies approximately 20 km W-NW of Tsumeb along the main road to Oshivelo. A collapsed sinkhole in dolomites. Gazetted on 15/09/1972
Roman Catholic Church	Buildings	<ul style="list-style-type: none"> Round-arched windows, axial tower with a later added hipped roof and a decorative cross, confessional-flanked entrance. Erected in 1913 and inaugurated in 1914.
German Private School	Building	<ul style="list-style-type: none"> Completed during WWI Served as school for 23 German children. Taken over as military hospital for the Germans.
OMEG-Minenbuero	Building	<ul style="list-style-type: none"> Oldest building in Tsumeb. Erected in 1907. Was used for various purposes over time: office, kindergarten, public library, and Methodist Church.
Second Director's House	Building	<ul style="list-style-type: none"> Situated near the OMEG-Minenbuero. Huge house surrounded by a garden with a pool. Turret on the top for ventilation.

3.2. Bio-Physical Environment

3.2.1. Climate

Tsumeb has a sub-tropical climate, with very hot summers and mild winters. The mean maximum temperature lies at 29,7° C, while the mean minimum temperature is 14,4° C. Occasional thunderstorms occur during the summer rainfall months, October to March. The average rainfall is 555 mm per annum (Tsumeb.info, 2023). Table 5 below provides some climatic variables for Tsumeb. Also see the climate graph in Figure 7 and the temperature graph in Figure 8 below.

Table 5: Climatic data (Mendelsohn et al., 2003)

Variable	Value
Approximate number of days of fog per year	0-1
Average values of solar radiation	6.0-6.2 /m ² /day
Hours of sunshine per day	8-9
Annual temperature (°C)	20-22
Days of frost per year	1-5
Average maximum temperatures during the hottest months (°C)	32-34
Average minimum temperatures during the coldest months (°C)	6-8
Average annual rainfall (mm)	550-600

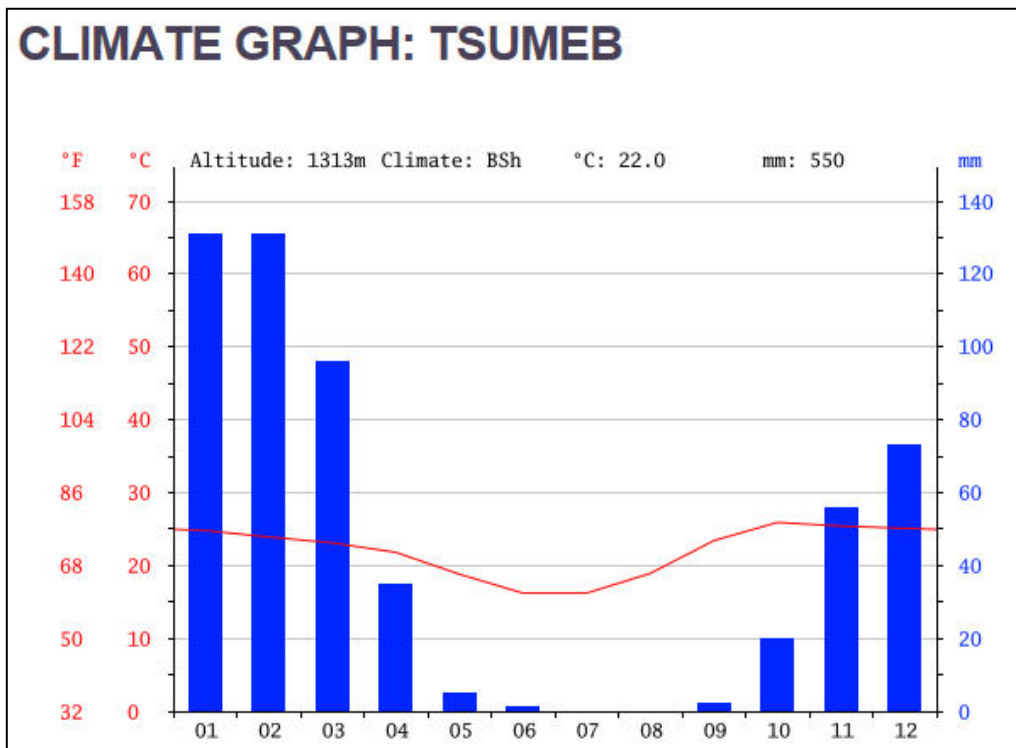


Figure 4: Average monthly temperature and rainfall for Tsumeb (Climate-data, 2024)

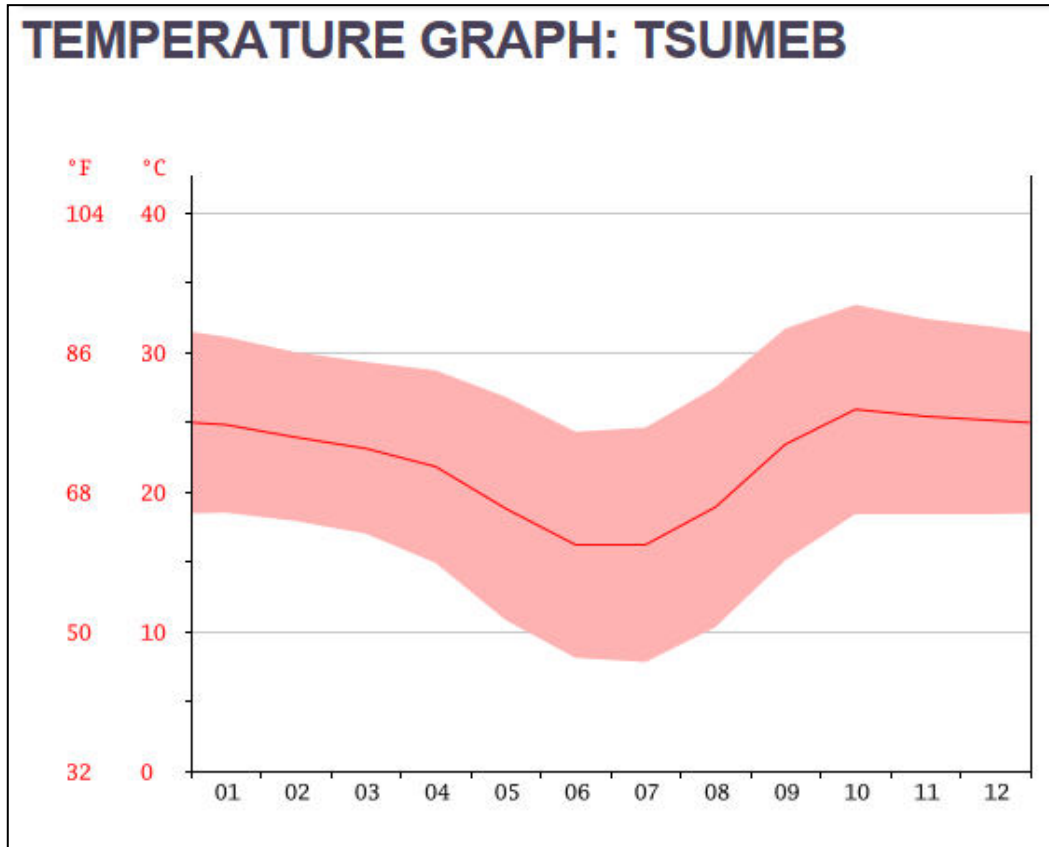


Figure 5: Temperature graph for Tsumeb (Climate-data, 2024)

3.2.2. Topography, Geology and Hydrogeology

The topography within 3 km of Tsumeb contains significant variations in elevation, with a maximum elevation change of 160 meters and an average elevation above sea level of 1300 meters. Strydom & Associates surveyed the Portion and prepared a detailed contour survey of the portion. From this survey the following can be observed:

- The site has two dolomite outcrops that varies in height and gradient. The outcrop in the southwestern corner of the site forms part of the foothills of the mountains to the southwest of the portion with steep gradients. The bulk of this outcrop (the steeper and more rocky areas) is only suitable to be used for a nature area combined with a hospitality establishment, but the foothills can be used for the establishment of several large residential erven.
- The dolomite outcrop located in the southeastern section of the site is lower than the other outcrop with a more gradual gradient with the potential to be used for a nature area or larger residential erven. This outcrop is also overgrown by beautiful large trees which should be retained during site preparation and construction. It can also be partly used as a public or private open space.

- The rest of the portion is relatively flat with a gradual gradient in a north westerly direction which also means that the area drains in that direction. This area is ideally suitable to be used for medium density residential, business, industrial and agricultural purposes. A surface drainage system is draining the area in northerly direction towards the railway line. This drainage system must be accommodated in the future development of the site to ensure the efficient surface drainage of the site and to ensure that no structures is put up in areas subject to a 1:50year flood risk. It is thus proposed that this drainage system is reserved as a public open space in the layout and land use planning of the site.
- There are borrow pits located in the northeastern are of the site. These pits are currently used by Tsumeb Municipality for road repairs and other landscaping projects in town. It can be rehabilitated to be used for the creation of erven or be used as source of filling material for the creation of bulk services and roads when the site is developed.

Tsumeb falls in the hydrogeological region known as the Otavi Mountain land which includes the northern Otjozondjupa, southern Oshikoto, and south-eastern Kunene Regions. This hydrogeological region starts from the Otavi, Grootfontein, Tsumeb triangle in the east following the southern rim of the Etosha basin and moves westwards to 70 km beyond Outjo. It is a dolomitic massif that rises up to 2,090 m above sea level that slopes gently towards Goblenz at 1,250 m above sea level and northwards to Oshivelo and Etosha at 2,800 3,000 m respectively (Christelis and Struckmeier, 2011). See Figure 6 below for the hydrogeological map of the site.

This area receives relatively high rainfall with a mean annual rainfall double that of the country as a whole, hence forming an important commercial farming area for cattle and maize. Most of the region has been declared a “Groundwater Control Area”, emphasising the national importance placed on the groundwater potential. The water supply scheme of Tsumeb is independent waterworks. Until the early 1990s, the domestic water supply to Tsumeb Municipality was entirely reliant on the 2.5Mm³/a of groundwater supplied, and purified, from the mine.

As the ore body diminished with time, the municipality drilled more than 15 production wells and until the Tsumeb Mine closed in June 1996, groundwater from the mine was purified and mixed with groundwater from the wells. Since then, groundwater abstraction by wells increased to a high of 3.1 Mm³/a in 1997, but by 1999 had been reduced to 1.7 Mm³/a. (Christelis and Struckmeier, 2011).

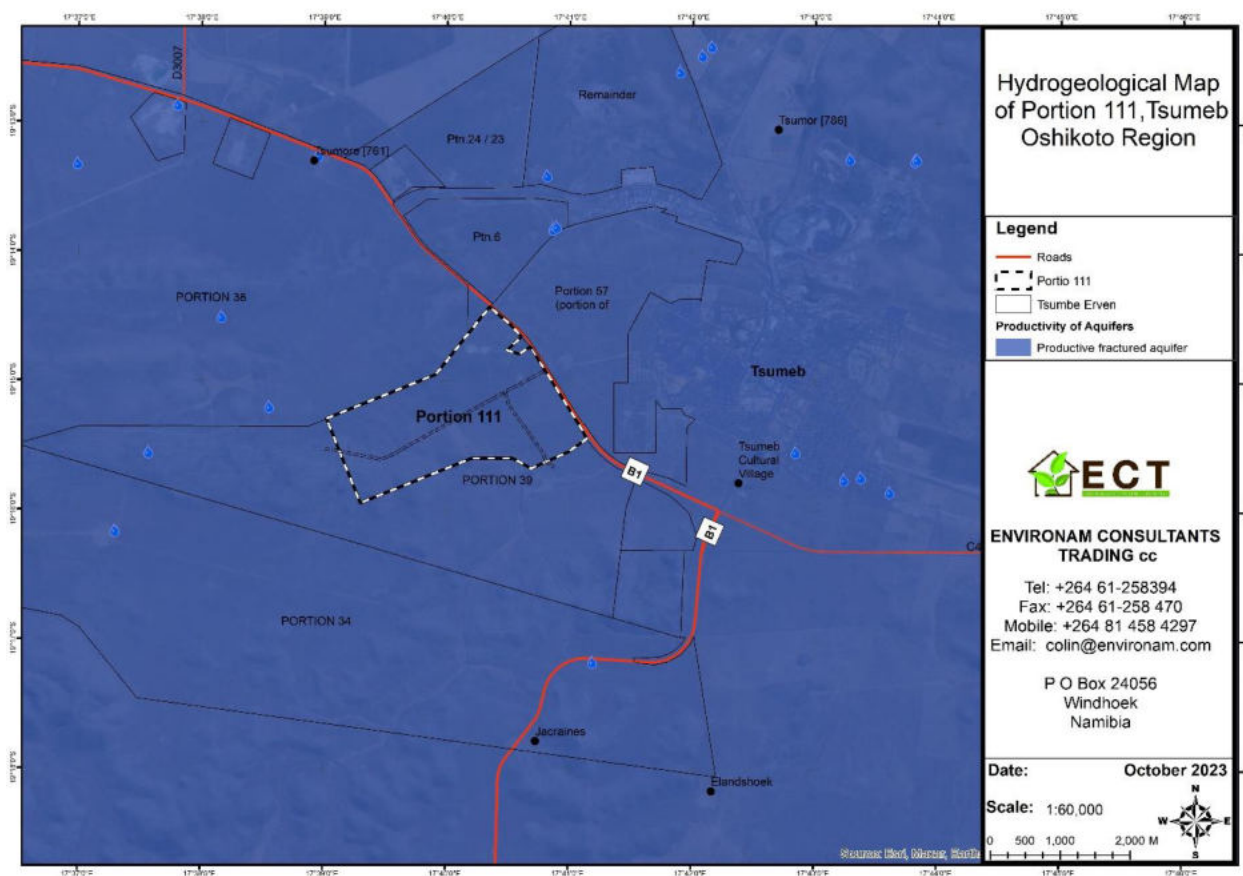


Figure 6: Hydrological map

3.2.3. Terrestrial Ecology

Tsumeb lies within the Tree-and-shrub Savanna Biome, the largest biome in Namibia characterised by large, open expanses of grasslands dotted with *Acacia* trees. It is specifically in the Karstveld sub-biome. The vegetation structure in the Tsumeb area is classified as Woodland, where *acacia* species, mopane trees and shrubs, and *Catophractes alexandri* are the dominant woody plants. In the south-east and west of the Karstveld woodlands purple-pod terminalia, sickle-bush, kudu bush and tamboti woodland are common (Mendelsohn et al., 2003). The proposed development area consists mainly of *Acacia* species and mopane trees and shrubs. Figure 7 below provides a view of the general area and surrounds of the proposed development site. Generally, the Karstveld is an area of high fauna and flora diversity. Table 6 below delineate the animal species diversity of the Tsumeb area:

Table 6: Species diversity (Mendelsohn et al., 2003)

Fauna	No. of Species (Country Total)	No. of Species (Tsumeb Area)	Remarks
-------	--------------------------------	------------------------------	---------

Fauna	No. of Species (Country Total)	No. of Species (Tsumeb Area)	Remarks
Bird	658	201-230	Tsumeb-Grootfontein-Otavi hills support many birds that are absent from surrounding Acacia Woodlands.
Frog	50	16-19	
Mammal	217	76-90	Includes Kudu, zebra, springbok
Reptile	258	71-80	Namibia has one of the richest lizard faunas in Africa
Scorpion	56	10-11	



Figure 7: General area of the proposed development site.

3.3. Surrounding Land Use

The surrounding land use of the proposed site consists of mainly vacant land. On the northern side the railway to the north passes along the property, and on the eastern side is the existing dumping site, which is planned to be decommissioned in the near future. The B1 main road to the north divides the dumping site and the development site. The Remainder of Portion 39 can be found to the south and north of the site and is earmarked for similar developments.

3.4. Physical Environment

The infrastructure needs of the proposed project can be categorised into two broad classifications namely:

- Basic infrastructure that includes water supply, drainage, electricity, and roads.
- Environmental infrastructure that consists of drainage and sewage system, solid waste management and landscaping.

Bulk water supply - the current water supply from Tsumeb Municipality will not be able to accommodate this development. Alternative supply sources will need to be looked at for servicing this site.

Bulk sewerage - it will be possible to connect to the existing municipal infrastructure to accommodate effluent generated by the site, and thereby utilizing the existing STP of Tsumeb Municipality for treatment of the effluent. Alternatively, onsite sewage treatment facilities can be constructed.

Roads and site access - there are two possible access intersections to the proposed project site, however both will need to be upgraded in order to comply with Roads Authority standards. The Tsumeb Municipality confirmed that either gravel or surfaced roads will suffice in terms of standard of service expectations.

Solid waste - solid waste generated by the development will be able to be accommodated by the Tsumeb Municipality new landfill site, as the development area falls within Municipal Townlands. The developer will however need to engage the Municipality in order for them to expand solid waste management services to the development site.

Bulk electrical - The current supply line from CENORED traversing the site will not have sufficient capacity to fully serve the development. However, during the initial phases of the project, connecting to the existing CENORED supply will be a viable option. However, it is advised that an application for connection and/ or a supply upgrade is lodged with CENORED. The viability of constructing a Solar PV plant was also elaborated and considering the high electrical demand of the development, implementing a Solar PV plant is a viable option. This can also be done in phases, increasing the size of the plant as the development expands.

Stormwater - A flood line study will be done for the development.

4. PROJECT DESCRIPTION

4.1. Proposed Development

As previously outlined in Section 1.1, the proposed project involves the Township Establishment on Portion 111 (a Portion of Portion 39) of Consolidated Farm Tsumore No. 761, Tsumeb. The proposed development will comprise a mixed-land use as indicated earlier, that can be grouped in the following:

1. Wildlife/Nature Estate
2. Residential
3. Hotels/Restaurants
4. Commercial/Business
5. Education (university, college, schools)
6. Agriculture
7. Industry - Agriculture

The mixed-use neighbourhood has been found to be the best basis for any new development. proposed development will have as its core objectives to:

- Conservation, rehabilitation and expansion of natural habitats & indigenous vegetation.
- Establish an Integrated Urban-Rural Development for Human Settlement for all income groups.
- Facilitate additional economic and small enterprise opportunities in the Tourism, Agri-Tourism, Agri-Processing and Public Transport Sectors.
- Establish an appropriate agriculture farming zone with the relevant processing and/or packaging facilities.

For designing and planning the village the Transect Concept was used as a tool to “organize” the development. It is a concept that was established by the idea that there is a place for every element in the built environment. It is a progression through a sequence of human habitats - increasing in density and complexity see Figure 13 for the Concept Site Development Plan.

The settlement hierarchy can be defined into six zones:

1. The Urban Core
2. Urban Centre
3. General Urban
4. Sub-urban
5. Rural
6. Natural

The pictures in Figures 8-12 below provide an indication of the various land uses that will be associated with the development.



Figure 8: Typical Village Centre Character



Figure 9: Typical Hamlet Character



Figure 10: Typical Farmstead Cluster Character



Figure 10: Typical Single Dwelling Character



Figure 11: Typical Parkland and Wilderness Character



Figure 12: Typical Natural Specialist District Industrial Character



Figure 13: Tsumeb Village Concept Site Development Plan

A possible 7th zone is the special district zone which applies to those elements of the built environment that do not fit into neighbourhoods. The nodes in the development proposal will be connected to one another with a series of roadways each finding its right place to create and work together as the greater whole of the development. Existing roadways will be traced to coincide and enhance the current movement over the landscape and reduce the impact of new road structure as far as possible.

4.2. No - Go Alternative

The no-go alternative would essentially entail maintaining the current situation, whereby residents of Tsumeb will experience an influx of people into town leading to uncoordinated growth, as a result of sprawling communities within the urban edge. The town will not be able to provide a sense of place an improved quality of life. In addition, no construction or operational jobs that come with the envisaged project will be created.

5. PUBLIC CONSULTATION PROCESS

5.1. Public Participation Requirements

Regulation 21 of the EIA Regulations makes provision for conducting a public consultation process as part of the EA process. This entails participatory consultation with members of the public by providing an opportunity to comment on the proposed project. The Public Consultation process has thus incorporated the requirements of Namibia’s legislation, and also takes account of national and international best practises. Please see **Table 7** below for the activities undertaken as part of the public participation process.

Table 7: Table of Public Participation Activities

ACTIVITY	REMARKS
Placement of site notices/posters in Tsumeb Town	See Annexure A
Placing advertisements in two newspapers for two consecutive weeks, namely Confidante and Windhoek Observer	See Annexure B
Written notice to affected landowners and adjacent landowners	See Annexure D
Written notice to Interested and Affected Parties via Email	See Annexure D
Public meeting in Tsumeb	07 December 2023, at the Nomtsoub Community Hall

A summary of the main issues raised by community members and Interested and Affected Parties are provided in **Table 8** below. Please see **Annexure D** for the minutes of the public meeting. The comment period of the initial public participation process commenced on **23 November 2023** and ended on **14 December 2023**.

Table 8: Main issues received during the public participation process

SUBJECT	ISSUE
INFORMATION SHARING	How is information about the project shared?

5.2. Public Consultation Process Phase 2

The second phase of the Public Consultation Process involved lodging of the Draft Scoping Report (DSR) to all registered I&AP for comment. Registered and potential I&APs were informed of the availability of the DSR for public comment *via* communication dated **09 February 2023**. An Executive Summary of the DSR was included in the communication that went out to the registered I&APs. I&APs were given time until **23 November 2023** to submit comments or raise any issues or concerns they may have with regard to the proposed project. No further comments were received during this period.

6. ASSESSMENT METHODOLOGY

Impact assessments depend on the nature and magnitude of the proposed activity, as well as the type of environmental control envisaged for the particular project. Given the nature of the proposed activity, i.e. a construction project, the identification and assessment of the potential impacts will be based on the type and scale of the various activities associated with the project.

Assessment of the predicted significance of impacts for a proposed development is by its nature, inherently uncertain. To deal with such uncertainty in a uniform manner, standardised and internationally recognised methodologies have been developed. One such accepted methodology is applied in this study to assess the significance of the potential environmental impacts of the proposed development, outlined as follows in **Table 9**.

Table 9: Impact Assessment Criteria

CRITERIA	CATEGORY
Impact	Description of the expected impact
Nature Describe type of effect	Positive: The activity will have a social / economical / environmental benefit. Neutral: The activity will have no effect Negative: The activity will have a social / economical / environmental harmful effect
Extent Describe the scale of the impact	Site Specific: Expanding only as far as the activity itself (onsite) Small: restricted to the site's immediate environment within 1 km of the site (limited) Medium: Within 5 km of the site (local) Large: Beyond 5 km of the site (regional)
Duration Predicts the lifetime of the impact.	Temporary: < 1 year (not including construction) Short-term: 1 - 5 years Medium term: 5 - 15 years Long-term: >15 years (Impact will stop after the operational or running life of the activity, either due to natural course or by human interference) Permanent: Impact will be where mitigation or moderation by natural course or by human interference will not occur in a particular means or in a particular time period that the impact can be considered temporary
Intensity Describe the magnitude (scale/size) of the Impact	Zero: Social and/or natural functions and/ or processes remain unaltered Very low: Affects the environment in such a way that natural and/or social functions/processes are not affected Low: Natural and/or social functions/processes are slightly altered Medium: Natural and/or social functions/processes are notably altered in a modified way High: Natural and/or social functions/processes are severely altered and may temporarily or permanently cease

CRITERIA	CATEGORY
Probability of occurrence Describe the probability of the Impact <u>actually</u> occurring	Improbable: Not at all likely Probable: Distinctive possibility Highly probable: Most likely to happen Definite: Impact will occur regardless of any prevention measures
Degree of Confidence in predictions State the degree of confidence in predictions based on availability of information and specialist knowledge	Unsure/Low: Little confidence regarding information available (<40%) Probable/Med: Moderate confidence regarding information available (40-80%) Definite/High: Great confidence regarding information available (>80%)
Significance Rating The impact on each component is determined by a combination of the above criteria.	Neutral: A potential concern which was found to have no impact when evaluated Very low: Impacts will be site specific and temporary with no mitigation necessary. Low: The impacts will have a minor influence on the proposed development and/or environment. These impacts require some thought to adjustment of the project design where achievable, or alternative mitigation measures Medium: Impacts will be experienced in the local and surrounding areas for the life span of the development and may result in long term changes. The impact can be lessened or improved by an amendment in the project design or implementation of effective mitigation measures. High: Impacts have a high magnitude and will be experienced regionally for at least the life span of the development, or will be irreversible. The impacts could have the no-go proposition on portions of the development in spite of any mitigation measures that could be implemented.

*NOTE: Where applicable, the magnitude of the impact has to be related to the relevant standard (threshold value specified and source referenced). The magnitude of impact is based on specialist knowledge of that particular field.

For each impact, the EXTENT (spatial scale), MAGNITUDE (size or degree scale) and DURATION (time scale) are described. These criteria are used to ascertain the SIGNIFICANCE of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place. The decision as to which combination of alternatives and mitigation measures to apply lies with the proponent, and their acceptance and approval ultimately with the relevant environmental authority.

The SIGNIFICANCE of an impact is derived by taking into account the temporal and spatial scales and magnitude. Such significance is also informed by the context of the impact, i.e. the character and identity of the receptor of the impact.

7. MITIGATION HIERACHY

The mitigation hierarchy (Figure 14) is a widely used tool that guides users towards limiting as far as possible the negative impacts on biodiversity from development projects. It emphasises best-practice of avoiding and minimising any negative impacts, and then restoring sites no longer used by a project, before finally considering offsetting residual impacts.

Following the hierarchy is crucial for all development projects aiming to achieve no overall negative impact on biodiversity or on balance, a net gain - also referred to as no net loss and the net positive approach, respectively. It is based on a series of essential, sequential - but iterative - steps taken throughout the project's life cycle in order to limit any negative impacts on biodiversity.

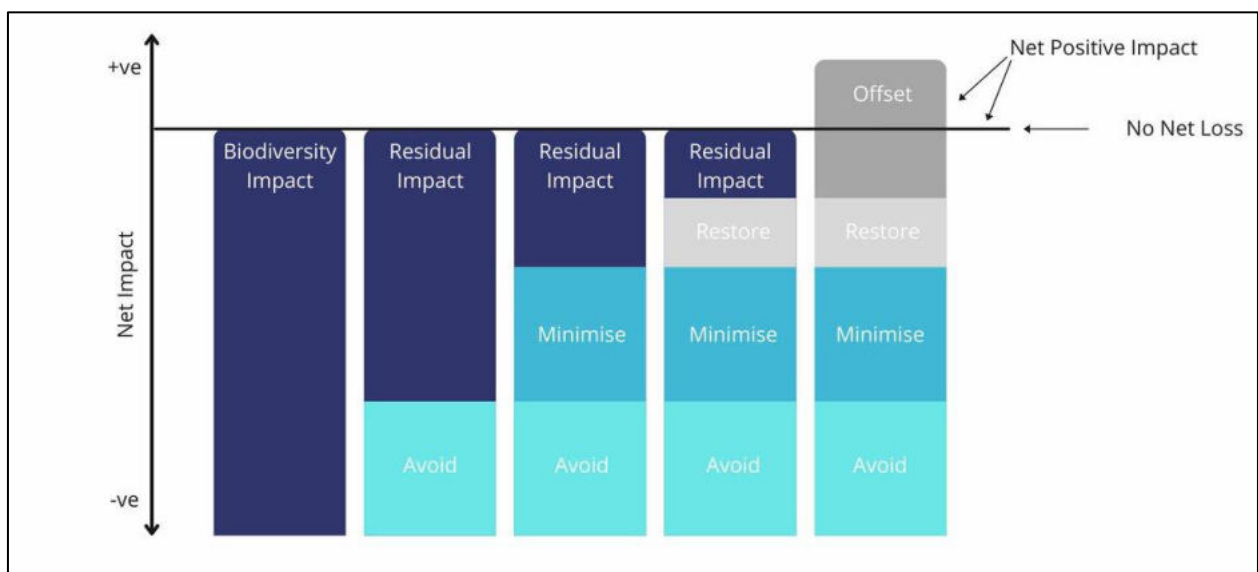


Figure 14: Mitigation Hierarchy

Sequential steps of the mitigation hierarchy

- 1. Avoidance:** the first step of the mitigation hierarchy comprises measures taken to avoid creating impacts from the outset, such as careful spatial placement of infrastructure, or timing construction sensitively to avoid or disturbance. Examples include the placement of roads outside of rare habitats or key species' breeding grounds, or timing of seismic operations when aggregations of whales are not present. Avoidance is often the easiest, cheapest and most effective way of reducing potential negative impacts, but it requires biodiversity to be considered in the early stages of a project.
- 2. Minimisation:** these are measures taken to reduce the duration, intensity and/or extent of impacts that cannot be completely avoided. Effective minimisation can eliminate some negative impacts, such as measures to reduce noise and pollution, designing powerlines to reduce the likelihood of bird electrocutions, or building wildlife

3. Rehabilitation/restoration: The aim of this step is to improve degraded or removed ecosystems following exposure to impacts that cannot be completely avoided or minimised. Restoration tries to return an area to the original ecosystem that was present before impacts, whereas rehabilitation only aims to restore basic ecological functions and/or ecosystem services - such as through planting trees to stabilise bare soil. Rehabilitation and restoration are frequently needed towards the end of a project's life cycle but may be possible in some areas during operation.

Collectively, avoidance, minimisation and rehabilitation/restoration serve to reduce, as far as possible, the residual impacts that a project has on biodiversity. Typically, however, even after their effective application, additional steps will be required to achieve no overall negative impact or a net gain for biodiversity.

4. Offset: offsetting aims to compensate for any residual, adverse impacts after full implementation of the previous three steps of the mitigation hierarchy. Biodiversity offsets are of two main types: 'restoration offsets' which aim to rehabilitate or restore degraded habitat, and 'averted loss offsets' which aim to reduce or stop biodiversity loss in areas where this is predicted. Offsets are often complex and expensive, so attention to earlier steps in the mitigation hierarchy is usually preferable.

Supporting Conservation Actions: measures taken which have positive - but difficult to quantify - effects on biodiversity. These qualitative outcomes do not fit easily into the mitigation hierarchy, but may provide crucial support to mitigation actions. For example, awareness activities may encourage changes in government policy that are necessary for implementation of novel mitigation, research on threatened species may be essential to designing effective minimisation measures, or capacity building might be necessary for local stakeholders to engage with biodiversity offset implementation.

8. POTENTIAL IMPACTS

This Chapter describes the potential impacts on the biophysical and socio-economic environments, which may occur due to the proposed activities. These include potential impacts, which may arise during the planning and design phase, potential construction related impacts (i.e. short to medium term) as well as the operational impacts of the proposed development (i.e. long-term impacts). The assessment of potential impacts will help to inform and confirm the selection of the preferred project plan and design to be submitted to the EC for consideration. In turn, the EC's decision on the environmental acceptability of the proposed project and the setting of conditions of authorisation (should the project be authorised) will be informed by this chapter, amongst other information contained in this ES Report.

The baseline and potential impacts that could result from the proposed development are described and assessed with potential mitigation measures recommended. Finally, comment is provided on the potential cumulative impacts which could result should this development, and others like it in the area, be approved.

8.1. Planning and Design Phase Impacts

During the planning and design phase consideration should be given to aspects such as the land use change; fauna and flora; existing infrastructure; and heritage sites.

8.1.1. Land Use Change

The development site, to a great extent, has been undeveloped over the years, save for existing agricultural activities taking place on the southernmost properties on proposed Extension 17. The area is scattered with predominantly Acacia trees/bushes and grass. The new structures on the site will change the character of the area; however, identifying and retaining as much of the important vegetation and introducing landscaping will augment the aesthetic value of the area, and minimise the impact.

8.1.2. Fauna and Flora (Biodiversity)

In the Cuvelai Basin, of which Tsumeb forms part, relatively few large wild animals live outside the Etosha National Park, movements of wildlife were tempered with firstly as human population in the Cuvelai increased and thereafter abruptly stopped by the erection of game-proof fences around Etosha between 1961 and 1973 (Berry, 1997). There are however reports of sightings of ostrich, springbok, kudu, and blue wildebeest in the Tsumeb area (Mendelsohn et al., 2013).

While no obvious large animals could be observed on the development site, it could however be expected that the surrounding areas which support natural vegetation will also support species of smaller vertebrates such as reptiles, amphibians, mammals and birds. Natural aquatic communities are largely absent from the region as a result of the absence of surface water flow due to the high infiltration rates.

Concern has been raised over the contamination of soils in Tsumeb, and by extension on the flora. Pollution could have an impact on vegetation structure in terms of canopy cover, understorey and ground cover. Studies within Tsumeb have indicated significant influence by heavy metal pollution related to mining emissions, although they tend to be more pronounced near the point source in particular around the Smelter (Nunes, 2007). However, contamination of vegetation with Molybdenum and Arsenic has been traceable over a distance of 12 km north-west of Tsumeb Smelter (Křibek et al., 2014).

Any type of development has potential negative environmental consequences, but identifying the most important fauna and flora species including high risk habitats beforehand, coupled with environmentally acceptable mitigating factors, lessens the overall impact of such development.

8.1.3. Existing Service Infrastructure Impacts

The new development will lead to an increased demand of services such as potable water, sewerage, electricity etc. This is bound to have an impact on the existing bulk infrastructure. The current water supply from Tsumeb Municipality will not be able to accommodate this development. Alternative supply sources will need to be investigated for servicing this site. Concern has been raised about the existing waste waterworks approaching its design capacity. The municipality intends to upgrade the facility as a short-term measure with plans to expand it in the long term (TSP, 2015). The Water Resources Management Act 11 of 2013 provides for water quality guidelines in terms of water supplies for drinking water, waste water treatment and discharge into the environment (See Appendix B of the EMP), these guidelines should be followed.

It is important to note that the country in general is constrained and faced with a crisis in terms of water and electricity availability; and an increased demand for these amenities will further add to the predicament. The general area however is known to have an abundance of natural ground water resources. In terms of access, there are two possible access intersections to the proposed project site, however both will need to be upgraded in order to comply with Roads Authority standards. The Tsumeb Municipality confirmed that either gravel or surfaced roads will suffice in terms of standard of service expectations. The construction of new professionally designed service infrastructure is expected to enhance the existing infrastructure.

8.1.4. Traffic Impacts

Traffic is expected to increase during the operational phase of the project. Due to the nature of the development and the land use various types of vehicles will frequent the area, these would mostly consist of vehicles used by businesses to deliver goods and services and the ones used by residents and clients. The proponent in consultation with the Roads Authority will initiate a formal application for access which will be followed by an on-site investigation to determine the most suitable access to the site.

8.1.5. Heritage impacts

There are a couple of important heritage sites that have been declared in Tsumeb and the surrounding. No known heritage sites are located within the proposed development area, however prompt reporting should take place in the instance of chance archaeological finds.

8.2. Construction Phase Impacts

During the construction phase the following potential impacts have been identified: pressure on the existing infrastructure; surface and ground water; public health, safety and security; impact on air quality, noise pollution, traffic congestion; solid waste management; hazardous substances; and social impact.

8.2.1. Pressure on existing infrastructure

During the construction phase there will be an additional demand for basic municipal services such as water, electricity and sewer. The services will be used for both human consumption and for construction purposes. These impacts will however only be limited to the construction phase and will thus have minimal short-term impact.

8.2.2. Surface and Ground Water Impacts

There are currently no visible surface water bodies to be considered with regard to the proposed site as there are no perennial water sources in the area. However, surface and ground water impacts may be encountered during the construction phase, especially if development takes place during the rainy season. The risk of contaminating such water sources can be increased by accidental spillage of oils and fuels and any other equipment used during construction; chemical contamination from construction materials such as cement, paint and mechanical fluids; and increased siltation due to surface runoff. This risk is minimised by the fact that the construction period will be a short-term activity.

8.2.3. Health, Safety and Security Impacts

It is expected that a high demand of construction workers for the project will be experienced, this may necessitate the deployment of a temporary migrant construction workforce in Tsumeb. These types of projects, where construction workers have the opportunity to interact with the local community, create a significant risk for the development of social conditions and behaviors that contribute to the spread of HIV and AIDS. In response to the threat posed by the pandemic, MEFT has also initiated a programme aimed at mainstreaming HIV and gender issues into environmental impact assessments.

8.2.4. Air Quality

During the construction phase fugitive exhaust gases and dust generated has a potential impact on the air quality of the area and its surroundings. Dust is a major component of air pollution and could negatively affect the health of nearby communities if not mitigated. These are however short-term impacts. Dust is generated mainly from the following activities:

- Excavations and stockpiles during site clearance;
- Use of heavy vehicles, machinery and equipment;
- Procurement and transport of construction materials to the site.

8.2.5. Noise Impacts

Noise is perceived as one of the most undesirable consequences of a construction activity. The most common reported impacts are interference in oral communication and sleep disturbance. The construction of the services and other structures will result in associated noise impacts. These noise impacts will mainly be associated with construction machinery and

vehicles, concrete and mixing; and excavation for foundations. The development site is a relatively far distance from the nearest residential area.

8.2.6. Traffic Impacts

Traffic is expected to increase during the construction phase of the project. Due to the size of the development a number of trucks and other heavy machinery will be required to deliver, handle and position construction materials as well as to remove spoil material. Not only will the increase in traffic result in associated noise impacts, it will also impact on the roads in the area. Fast moving traffic in particular is prominent on the adjacent B1 road with vehicles travelling to and from north-central Namibia. The use of slow-moving heavy construction trucks has the potential to cause traffic jams.

8.2.7. Solid Waste Management

The construction activities will lead to the generation of significant amounts of solid waste mainly in the form of construction building rubble. This could have a negative environmental impact if not managed well. All solid waste should be disposed of at the designated landfill site of Tsumeb as approved by the local authority.

8.2.8. Storage and Utilisation of Hazardous Substances

Hazardous substances are regarded by the Hazardous Substance Ordinance (No. 14 of 1974) as those substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances. It covers manufacture, sale, use, disposal and dumping as well as import and export. During the construction period, the use and storage of these types of hazardous substances, such as shutter oil, curing compounds, types of solvents, primers and adhesives and diesel, on-site could have negative impact on the surrounding environment, if these substances spill and enter the environment.

8.2.9. Social Impacts

The project will result in short-term positive impacts as far as the social welfare of the affected community is concerned. There is potential of an influx of migrant workers to the town which would boost the local economic development of the town as a result of an increase in the purchase of consumer goods. The local community will benefit through preferential recruitment of local labour as far as possible.

8.3. Operational Phase Impacts

The operational phase impacts that have been identified are: surface and ground water; air quality; noise; solid and Industrial waste; social; visual impact.

8.3.1. Surface and Ground Water Impacts

There are currently no visible surface water bodies to be considered with regard to the proposed site as there are no perennial water sources in the area, however the Tsumeb area

is known for its abundant underground water resource which is at risk of contamination from the activities envisaged to take place on site.

This resource is so important and easily accessible that consideration is given to extract more water during periods of prolonged droughts. This water can then be conveyed via the Eastern National Water Carrier (ENWC) to the central areas of the country (Windhoek, Okahandja, Karibib, Otjihase and Navachab mines) to overcome temporary, emergency water shortages there (Christelis and Struckmeier, 2011).

The provision of professionally designed and constructed municipal services to the development will minimise the potential pollution of water sources because they will be linked to an organised reticulation. It is imperative that preventative maintenance of the infrastructure is carried out on a regular basis to ensure early detection of leaks that can contaminate the groundwater resource. The users of the new township will not be allowed to discharge waste directly into the environment. The Water Resources Management Act 11 of 2013 makes provision for requirements in terms of water supplies for drinking water and for waste water treatment and discharge into the environment. These guidelines should be adhered to.

8.3.2. Air Quality

Air quality in Tsumeb has been a cause for concern for many stakeholders such as mineworkers, residents, and government. This has necessitated various studies on the impact of the mining activities on the environment. The sources of contamination have been identified as: solid emissions from the copper smelter containing high amounts of potentially toxic metals; dust from the beaches of tailing impoundments; and slag deposits. While tests carried out indicate contamination of the Tsumeb Town area from SO₂ emissions for example, the concentrations are said to be low and acceptable by regulations (Křibek et al., 2014). Dust emissions are an existing occurrence in the surrounding area from activities such as crushing.

Petrol- and diesel-powered vehicles are amongst the major contributors of toxic air contaminants and may be the leading source of public exposure to such contaminants. Carbon Monoxide is amongst the major pollutants emitted by vehicles through the exhaust systems (Faiz et al., 1996). This is particularly at the highest when vehicles are in a poor state of maintenance causing incomplete combustion. The operations in the area need to be controlled and managed as required by the Public Health Act (Act No. 36 of 1919) and Atmospheric Pollution Prevention Ordinance (No. 11 of 1976).

The 2005 “World Health Organisation (WHO) Air Quality Guidelines” offer global guidance on thresholds and limits for key air pollutants that pose health risks (see Table 10 below):

Table 10: WHO Air Quality Guidelines (WHO, 2016)

Pollutant	Guideline value
PM _{2.5}	10 µg/m ³ annual mean 25 µg/m ³ 24-hour mean

Pollutant	Guideline value
PM ₁₀	20 µg/m ³ annual mean 50 µg/m ³ 24-hour mean
Ozone (O ₃)	100 µg/m ³ 8-hour mean
Nitrogen dioxide (NO ₂)	40 µg/m ³ annual mean 200 µg/m ³ 1-hour mean
Sulfur dioxide (SO ₂)	20 µg/m ³ 24-hour mean 500 µg/m ³ 10-minute mean

8.3.3. Noise Impacts

Various types of activities within the township extension will result in increased dust and emission impacts, if not managed correctly. Dust and emissions associated with the proposed new township development will mostly be generated by vehicle movement; as well as from any commercial activity that generates emissions. It is therefore important that mitigation measures are applied to bring these noise levels to acceptable limits.

8.3.4. Solid and Industrial Waste

The operational activities will likely generate a reasonable amount of solid waste. Solid waste generated by the development will be able to be accommodated by the Tsumeb Municipality new landfill site, as the development area falls within Municipal Townlands. An adequate number of refuse receptacles should be placed on all the properties for the collection of waste, which should be emptied frequently and taken to the designated landfill site. This should be fitted into the municipal waste collection programme.

8.3.5. Social Impact

The development will serve as an important economic activity that provides jobs. It also serves as a critical factor that attracts people including professionals and investors to migrate to and invest in the town. These factors will in turn also have a positive impact on the quality of life of the residents in terms of household incomes.

8.3.6. Visual and Sense of Place Impacts

The new development will be visually prominent from the B1 Main Road to Oshivelo. The additional buildings and infrastructure to be erected on site will cause a higher visual impact to the natural area. The new development will have an impact on the sense of place of the town. Therefore, the aesthetics quality of the new structures has to be pleasing and designed to blend in with the natural surrounds.

9. SUMMARY OF POTENTIAL IMPACTS

A summary of the significance of the potential impacts from the proposed project assessed above is included in **Table 11**. The **Tables 12 - 14** provide a summary of the mitigation measures proposed for the impacts.

Table 11: Overview of potential impacts

Impacts	Negative		Positive		No Impact
	Short Term	Long Term	Short Term	Long Term	
Planning and Design Phase					
1. Land use change				X	
2. Fauna and flora	X				
3. Existing infrastructure				X	
4. Heritage sites					X
Construction Phase					
5. Pressure on existing infrastructure	X				
6. Surface and ground water	X				
7. Public health, safety and security	X				
8. Air quality	X				
9. Noise	X				
10. Traffic	X				
11. Solid waste management	X				
12. Hazardous substances	X				
13. Social impacts			X		
Operational Phase					

Impacts	Negative		Positive		No Impact
	Short Term	Long Term	Short Term	Long Term	
14. Surface and ground water		X			
15. Air Quality		X			
16. Noise		X			
17. Solid waste		X			
18. Social				X	
19. Visual				X	

Table 12: Proposed mitigation measures for the planning and design phase

PLANNING AND DESIGN PHASE IMPACTS	
Impact	Mitigation Measures
Land use change	<ul style="list-style-type: none"> • Ensure that proposed developments are aligned with the zoning. • Identify, retain and incorporate as much of the important indigenous trees. • Introduce landscaping to supplement and replace existing and removed vegetation.
Fauna and flora	<ul style="list-style-type: none"> • Adapt the proposed developments to the local environment - e.g. small adjustments to the site layout could avoid existing trees, etc. • Identify and prevent the destruction of protected tree species. • Prevent contractors from collecting wood, veld food, etc. during the construction phase. • Do not clear the entire development site, but rather keep the few individuals and/or clumps of trees/shrubs not directly affecting the development as part of the landscaping. • The trees that are to be kept should be clearly marked with “danger tape” to prevent accidental removal. • Regular inspection of the marking tool should be carried out. • The very important trees should be “camped off” to prevent the unintended removal or damage to these trees. • Plant local indigenous species of flora as part of the landscaping as these species would require less maintenance than exotic species. • Prevent the introduction of potentially invasive alien ornamental plant species such as; Lantana, Opuntia, Prosopis, Tecoma, etc.; as part of the landscaping as these species could infestate the area further over time. • Transplant removed trees where possible, or plant new trees in lieu of those that have been removed. • Consider remediation of any potential contaminated soils to be used for planting.

Existing service infrastructure	<ul style="list-style-type: none"> • It is recommended that alternative and renewable source of energy be explored and introduced into the proposed development to reduce dependency on the grid. • Solar geysers and panels should be introduced to provide for general lighting and heating of water and buildings. • Other ‘green’ technologies to reduce the proposed development’s dependency on fossil fuel should be explored where possible. • Designs and building materials should be as such to reduce dependency on artificial heating and cooling in order to limit the overall energy demand. • Water saving mechanisms should be incorporated within the proposed development’s design and plans in order to further reduce water demands. • Re-use of treated waste water should be considered wherever possible to reduce the consumption of potable water. • Adhere to water quality guidelines in terms of The Water Resources Management Act 11 of 2013.
Traffic	<ul style="list-style-type: none"> • Consult the Roads Authority to determine and agree on the most suitable access to the sites.
Heritage sites	<ul style="list-style-type: none"> • The project management should be made aware of the provisions of the National Heritage Act regarding the prompt reporting of archaeological finds. • In the event of such finds, construction must stop and the project management or contractors should notify the National Heritage Council of Namibia immediately.

Table 13: Proposed mitigation measures for the construction phase

CONSTRUCTION PHASE IMPACTS	
Impact	Mitigation Measures
Pressure on existing infrastructure	<ul style="list-style-type: none"> • Ensure all potable water points are metered and regularly read. • Ensure that the workforce is provided with temporary toilets during the construction phase. • Waste from the temporary toilets should be disposed of at the Tsumeb Wastewater Treatment Works. • A sufficient number of waste bins should be placed around the site for the soft refuse. • A sufficient number of skip containers for the heavy waste and rubble should be provided for around the site. • Solid waste will be collected and disposed of at an appropriate local land fill in Tsumeb, in consultation with the local authority.
Surface and ground	<ul style="list-style-type: none"> • It is recommended that construction takes place outside of the rainy season in order to limit flooding on site

CONSTRUCTION PHASE IMPACTS	
Impact	Mitigation Measures
water impacts	<p>that may lead to ground and surface water pollution.</p> <ul style="list-style-type: none"> • No dumping of waste products of any kind in or in close proximity to surface water bodies should be allowed. • Heavy construction vehicles should be kept out of any surface water bodies and the movement of construction vehicles should be limited where possible to the existing roads and tracks. • Ensure that oil/ fuel spillages from construction vehicles and machinery are minimised and that where these occur, that they are appropriately dealt with. • Drip trays must be placed underneath construction vehicles when not in use to contain all oil that might be leaking from these vehicles. • Contaminated runoff from the construction sites should be prevented from entering water bodies. • All materials on the construction site should be properly stored. • Disposal of waste from the sites should be properly managed and taken to the Tsumeb landfill site. • Construction workers should be given ablution facilities at the construction sites that are located at least 30 m away from any surface water and these should be regularly serviced. • Washing of personnel or any equipment should not be allowed on site. Should it be necessary to wash construction equipment these should be done at an area properly suited and prepared to receive and contain polluted waters.
Health, Safety and Security	<ul style="list-style-type: none"> • Construction personnel should not overnight at the site, but only the security personnel. • Ensure that all construction personnel are properly trained depending on the nature of their work. • Provide for a first aid kit and a properly trained person to apply first aid when necessary. • A wellness program should be initiated to raise awareness on health issues, especially the impact of sexually transmitted diseases. • Provide free condoms in the workplace throughout construction and project operation. • Facilitate access to Antiretroviral medication • Restrict unauthorised access to the site and implement access control measures • Clearly demarcate the construction site boundaries along with signage of “no unauthorised access”. • Clearly demarcate dangerous areas and no-go areas on site. • Staff and visitors to the site must be fully aware of all health safety measures and emergency procedures. • The contractor must comply with all applicable occupational health and safety requirements. • The workforce should be provided with all necessary Personal Protective Equipment where appropriate.

CONSTRUCTION PHASE IMPACTS	
Impact	Mitigation Measures
Traffic	<ul style="list-style-type: none"> • Limit and control the number of access points to the site. • Minimise using the B1 national road for access to the site. • Ensure that road junctions have good sightlines. • Construction vehicles' need to be in a road worthy condition and maintained throughout the construction phase. • Transport the materials in the least number of trips as possible. • Adhere to the speed limit. • Implement traffic control measures where necessary. • Minimise the movement of heavy vehicles during peak time.
Noise	<ul style="list-style-type: none"> • No amplified music should be allowed on site. • Inform immediate neighbours of construction activities to commence and provide for continuous communication between the neighbours and contractor. • Limit construction times to acceptable daylight hours. • Install technology such as silencers on construction machinery. • Do not allow the use of horns as a general communication tool, but use it only where necessary as a safety measure. • Provide protective equipment such as ear muffs and ear plugs to workers.
Air quality	<ul style="list-style-type: none"> • All loose material should be kept on site for the shortest possible time. • It is recommended that a dust suppressant such as Dustex be applied to all the construction clearing activities to minimise dust emissions. • Construction vehicles to only use designated roads. • During high wind conditions the contractor must make the decision to cease works until the wind has calmed down. • Cover any stockpiles with plastic to minimise windblown dust. • Provide workers with dust masks. • Ensure construction vehicles are well maintained to prevent excessive emissions of smoke.

CONSTRUCTION PHASE IMPACTS	
Impact	Mitigation Measures
Solid Waste	<ul style="list-style-type: none"> • A sufficient number of waste bins should be placed around the site for the soft refuse. • A sufficient number of skip containers for the heavy waste and rubble should be provided for around the site. • Solid waste will be collected and disposed of at an appropriate local land fill in Tsumeb, in consultation with the local authority.
Hazardous Substances	<ul style="list-style-type: none"> • All chemicals and other hazardous substances must be stored and maintained in accordance with the Hazardous Substances Ordinance (No. 14 of 1974), with all relevant licences and permits to be obtained where applicable. • Given the potential harm to human health during handling and use of any of hazardous substances it is essential that all staff be trained with regards to the proper handling of these substances as well as First Aid in the case of spillage or intoxication. • Storage areas for all substances should be bunded and capable to hold 120% of the total volume of a given substance stored on site.
Social	<ul style="list-style-type: none"> • Ensure locals enjoy priority in terms of job opportunities for skills that are available locally, to the extent possible. • Ensure local procurement where commodities are available locally.

Table 14: Proposed mitigation measures for the operational phase

OPERATIONAL PHASE IMPACTS	
Impact	Mitigation Measures
Surface and Ground Water	<ul style="list-style-type: none"> • A no-go buffer area of at least 15 m should be allocated to any water bodies in the area. • No dumping of waste products of any kind in or in close proximity to any water bodies. • Contaminated runoff from the various operational activities should be prevented from entering any

OPERATIONAL PHASE IMPACTS	
Impact	Mitigation Measures
	<p>water bodies.</p> <ul style="list-style-type: none"> • Ensure that surface water accumulating on-site are channelled and captured through a proper storm water management system to be treated in an appropriate manner before disposal into the environment. • Wastewater should not be discharged directly into the environment. • Disposal of waste from the development should be properly managed. • The service infrastructure should be designed and constructed by suitably qualified engineering professionals. • Develop and implement a preventative maintenance plan for the service infrastructure.
Visual and Sense of Place	<ul style="list-style-type: none"> • It is recommended that more ‘green’ technologies be implemented within the architectural designs and building materials of the development where possible in order to minimise the visual prominence of such a development within the more natural surrounding landscape. • Natural colours and building materials such as wood and stone should be incorporated as well as the use of indigenous vegetation in order to beautify the development. • Visual pollutants can further be prevented through mitigations (i.e. keep existing trees, introduce tall indigenous trees; keep structures unpainted and minimising large advertising billboards).
Noise	<ul style="list-style-type: none"> • Limit the types of activities that generate excessive noise within the new development. • All areas where noise levels are above 85 dB should be managed and controlled in accordance with the Labour Act. • Continuous monitoring of noise levels should be conducted to make sure the noise levels do not exceed acceptable limits. • No activity having a potential noise impact should be allowed after 18:00 if possible.
Air quality	<ul style="list-style-type: none"> • Consider tarring/paving of the internal road network. • Manage activities that generate emissions or dust. • Ensure that activities generating emissions are equipped with pollution controlling technologies. • Ensure emissions from any activity within the proposed development site are within the World

OPERATIONAL PHASE IMPACTS	
Impact	Mitigation Measures
	Health Organisation (WHO) Air Quality Guidelines.
Solid waste	<ul style="list-style-type: none"> • A sufficient number of waste bins should be placed on the properties for the soft refuse. • A sufficient number of skip containers for the heavy waste and rubble should be provided for at appropriate sites. • The waste containers should be able to be closed to prevent birds and other animals from scavenging. • Solid waste will be collected and disposed of at an appropriate local land fill in Tsumeb, this should be done in consultation with the local authority.
Social	The township establishments and other related developments will greatly contribute to the well-being and quality of life of the Tsumeb residents.

10. CONCLUSION AND RECOMMENDATIONS

10.1. Construction Phase Impacts

With reference to **Table 11**, most of the construction phase impacts were deemed to have a negative impact without mitigation. However, these were mostly short-term and can be significantly reduced with the mitigation measures proposed.

10.2. Operational Phase

During the operational phase the impacts of surface and ground water; air quality; noise; and solid waste were assessed to have a long-term negative effect without mitigation. The impacts will however be significantly reduced when the recommended mitigation measures in the scoping report and environmental management plan (EMP) are implemented.

10.3. Level of Confidence in Assessment

With reference to the information available at this stage, the confidence in the environmental assessment undertaken is regarded as being acceptable for the decision-making, in terms of the environmental impacts and risks. The Environmental Assessment Practitioner believes that the information contained within this scoping report is adequate to allow the EC to determine the environmental viability of the proposed project.

It is acknowledged that the project details may evolve during the detailed design and construction phases. However, these are unlikely to change the overall environmental acceptability of the proposed project and any significant deviation from what was assessed in this report should be subject to further assessment. If this was to occur, an amendment to the Environmental Authorisation may be required in which case the prescribed process would be followed.

10.4. Mitigation Measures

With the implementation of the recommended mitigation measures in this report as well as in the EMP, the significance of the planning and design, construction and operational phase impacts is likely to be reduced to a **Low (negative)**. It is further extremely important to include an Environmental Control Officer (ECO) on site during the construction phase of the proposed project to ensure that all the mitigation measures discussed in this report and the EMP are enforced.

It is strongly advised that the proponent appoint a suitably qualified consulting engineer to design and supervise the construction of the service infrastructure. It is also advised to develop and implement a preventative maintenance plan for the service infrastructure, which shall be monitored and evaluated regularly. It is recommended that site specific

Environmental Management Plans (EMPs) are developed for listed activities that will take place on the site.

It is noted that where appropriate, these mitigation measures and any others identified by the EC could be enforced as Conditions of Approval in the Environmental Authorisation, should the EC issue a positive Environmental Authorisation.

10.5. Opinion with respect to the Environmental Authorisation

Regulation 15(j) of the EMA, requires *that the EAP include an opinion as to whether the listed activity must be authorised and if the opinion is that it must be authorised, any condition that must be made in respect of that authorisation.*

It is recommended that this project be authorised, as the establishment of the township is seen as an improvement on the current status of the town's development. From a social perspective, the provision of municipal services and township development is highly important for the community to enhance their livelihoods and in turn also uplift the general economy of the town. These factors will in turn also have a positive impact on the quality of life of the residents both in terms of health and household incomes.

The significance of negative impacts can be reduced with effective and appropriate mitigation provided in this report and the EMP attached. If authorised, the implementation of an EMP should be included as a condition of approval.

11. REFERENCES

1. Berry, H.H. 1997. Historical review of the Etosha region and its subsequent administration as a national park. *Madoqua* 20(1): 3-12.
2. Climate-data, 2016. Available at: <http://en.climate-data.org/location/2770/>. Accessed (11/08/2016).
3. Christelis, G., and Struckmeier, W., 2011. Groundwater in Namibia. an explanation to the Hydrogeological Map.
4. Faiz, A., Weaver, C.S., Walsh, M.P., 1996. Air Pollution from Motor Vehicles: Standards and Technologies for Controlling Emissions. The International Bank for Reconstruction and Development/The World Bank.
5. Křibek et al., 2014. ORE PROCESSING ON THE ENVIRONMENT IN THE TSUMEB AREA, NAMIBIA. *Communs geol. Surv. Namibia*, 15, 111-116
6. Mendelsohn, j., et al., 2003. Atlas of Namibia. A portrait of the land and its People. David Phillip. Cape Town.
7. Mendelsohn, J., Jarvis, A., Robertson, T., 2013. A profile and Atlas of the Cuvelai-Etosha Basin. RAISON. Windhoek.
8. National Heritage Council Namibia (NHCN), 2016. Available at: (www.nhc-nam.org).
9. National Statistics Agency (NSA), 2011. Namibia 2011 Population and Housing Census Main Report. Available at : <http://nsa.org.na/page/publications>.
10. Nunes, I. N., 2007. Impact of the Tsumeb Smelter Waste on Plant Species Diversity and Structure In Tsumeb, North central Namibia. A thesis submitted in partial fulfilment of the requirements for the degree of Master of Science in Biodiversity Management and Research at the University of Namibia and Humboldt-Universität zu Berlin.
11. SADC Environmental Legislation Handbook (SELH), 2012. Available at: http://www.saiea.com/dbsa_handbook_update2012/pdf/Handbook.pdf.
12. Tsumeb Structure Plan (TSP), 2023. Tsumeb Structure Plan.
13. World Health Organisation (WHO), 2016. Ambient (outdoor) air quality and health Available at: <http://www.who.int/mediacentre/factsheets/fs313/en/>. (Accessed 28/07/2023).