Proposed Water Pipeline from the Kranzberg Aquifer Boreholes via Karibib to Twin Hills Mine, Erongo Region

Final EIA Scoping Report

Osino Gold Exploration and Mining (Pty) Ltd in collaboration with Namibia Water Corporation Ltd

Prepared by:
SLR Environmental Consulting (Namibia) (Proprietary) Limited
8 General Murtala Muhammed Ave, Eros, Windhoek

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Project Manager	Stephanie Strauss
Project Manager Email	sstrauss@slrconsulting.com
Author	Stephanie Strauss
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Report Sign Off and Approvals

(Stephanie Strauss) **(Marline Medallie)**

Basis of Report

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Executive Summary

1.0 Introduction

This Executive Summary provides a synopsis of the Final Scoping Report (THIS REPORT) prepared as part of the Environmental Impact Assessment (EIA) process that is being undertaken for an application for the development of the proposed water pipeline from the Kranzberg Aquifer boreholes via Karibib to the Twin Hills Gold Mine in the Erongo Region (the Project) (See Figure 1).

Osino Gold Exploration and Mining (Pty) Ltd (Osino) has appointed SLR to undertake the EIA, which is a separate environmental approval process from the process that was conducted and completed for the mining operations and for which an Environmental Clearance Certificate (ECC) has been obtained from the Ministry of Environment, Forestry and Tourism (MEFT).

1.1 Project Background

Osino is currently developing the Twin Hills Gold Mine Project, located 25 km northeast of Karibib within the Erongo Region. A Definitive Feasibility Study (DFS) for the project was published in July 2023. Responsible social and environmental design criteria have been key DFS elements to develop the over 13 km strike, sediment-hosted, structurally controlled hydrothermal gold system. The following is summarised from the DFS:

- The Project is proposed to be a conventional open pit mine with a gold extraction process similar to the existing gold mines in Namibia, such as the Otjikoto and Navachab mines.
- The deposit is an orogenic-style, sedimentary-hosted, structurally controlled gold deposit, which is contemplated as an open pit with associated infrastructure.
- DFS process plant design during Life of Mine (LOM) will achieve gold recovery of 92% utilising conventional 3-stage crushing, ball milling, gravity separation, pre-oxidation and Carbon in Leach (CIL) circuit plus filtration & dry-stack tailings storage facility with less than 16% moisture content.
- 13-year LOM is projected with 5.0 million tonnes per annum (Mtpa) design processing capacity.
- The estimated water demand of 3 300 m^3/day, or 1.1 Million m^3/a is calculated based on the infrastructure and plant designs that will initially cater for 5 Mtpa throughput. The process design aims to maximise the re-use of water by recycling process solutions wherever possible through filtration systems in the plant.
- Multiple water sources are being investigated to meet water demand and to supply approximately 3 300 m^3/day, or 1.1 Million m^3/a. This supply strategy is based on sustainable yields tested during the field program and will be supplemented by pit dewatering later in the LOM.

Osino is still investigating other water sources, despite the success of the water supply investigations undertaken to date on the Karibib Marble Aquifer. The aim is to ensure water security and minimise potential impact of local sources owning to the fact that the Twin Hills Gold project is located in the water scarce Central Areas of Namibia (CAN).

Options under investigation include the Kranzberg Aquifer from where a water pipeline is proposed to be developed in collaboration with the Namibia Water Corporation Ltd (NamWater). The pipeline will start from boreholes tapping the aquifer and transferring water via Karibib to the Twin Hills Gold Mine.

The Project triggers listed activities in terms of the EIA Regulations 2012 promulgated under the Environmental Management Act, 2007 (No. 7 of 2007) (EMA). An ECC is required from the MEFT. With the Ministry of Agriculture, Water and Land Reform (MAWLR) as the Competent Authority that needs to be engaged.

Therefore, SLR Environmental Consulting Namibia (Pty) Ltd (SLR) was commissioned by Osino to undertake the EIA for the water pipeline proposed from the Kranzberg Aquifer boreholes to the Twin Hills Mine in the Erongo Region.

1.2 Purpose of this Report

This Final EIA Scoping Report and EMP has been prepared in compliance with Section 8 and 15(2) of the EIA Regulations 2012 as part of the EIA that is being undertaken for the proposed Water Pipeline from the Kranzberg Aquifer boreholes via Karibib to Twin Hills Mine.

The compilation of this report has been informed by comments received from Interested and Affected Parties (I&APs) during the draft EIA Scoping Report review and comment period (6 February 2024 to 27 February 2024 (and further extended to 18 March 2024)) and those raised during the various public and focus group meetings held as part of the EIA process. Comments received by SLR have been recorded and responded to in a Comments and Responses Report (see Appendix C6 of the main report). **It should be noted that all significant changes to the draft report are underlined and in a different font (Times New Roman) to the rest of the text.**

This report is submitted to the competent authority, the Ministry of Agriculture, Water and Land Reform (MAWLR), for consideration and review. In terms of Section 32 of the EMA, MAWLR will then make a recommendation on the acceptance or rejection of the report to the MEFT: Directorate of Environmental Affairs, who will make the final decision on the ECC application.

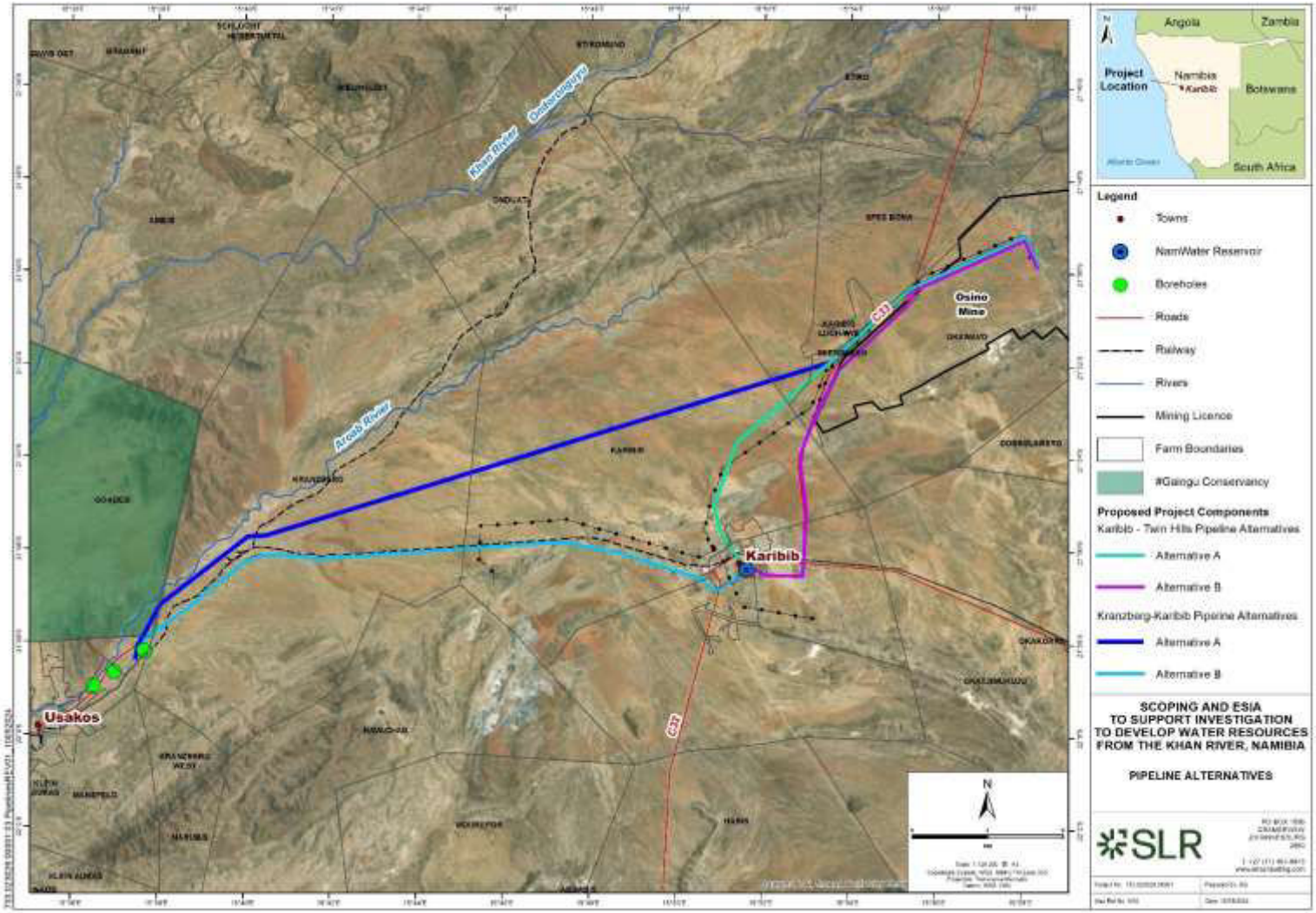

Figure 1: Project Locality

1.3 Opportunity to Comment

The Draft Scoping Report and EMP was distributed from **6 February 2024 to 27 February 2024 (and further extended to 18 March 2024)** to provide Interested and Affected Parties (I&APs) with an opportunity to comment on any aspect of the proposed project and the findings of the EIA process to date. Copies of the full report were available on the SLR website (at https://www.slrconsulting.com/en/public-documents/) and at the following locations:

Name of Facility	Physical Address and Tel.
Karibib Community Library	Hidipo Hamutenya Road, Karibib Tel: (064) 530602
Usakos Community Library	Theo Ben Gurirab Street, Usakos Tel: (064) 530099
Omaruru Community Library	Wilhelm Zeraua Road, Omaruru Tel: (064) 570057

Comments received by SLR at the address, telephone/ fax numbers or e-mail address shown below on or before **18 March 2024** have been included in the final EIA Scoping Report and EMP.

SLR Environmental Consulting (Namibia) (Pty) Ltd
Attention: Stephanie Strauss
Postal Address: 8 General Murtala Muhammed Ave, Eros Windhoek
Tel: 061 231 287
E-mail: osino-water@slrconsulting.com
SLR Website: https://www.slrconsulting.com/en/public-documents/

Details of the public participation process (PPP) undertaken to date are provided in Chapter 2.0 of this SR.

1.4 Introduction to the Environmental Impact Assessment Process

In Namibia, Environmental Impact Assessments are regulated by the Directorate of Environmental Affairs (DEA) division of the Ministry of Environment, Forestry and Tourism (MEFT) in terms of the EMA. This Act was gazetted on 27 December 2007 and the EIA Regulations were promulgated on 6 January 2012.

The EIA process is an interdisciplinary and multi-step procedure to ensure that environmental considerations are included in decisions regarding projects that may impact the environment (See Figure 2).

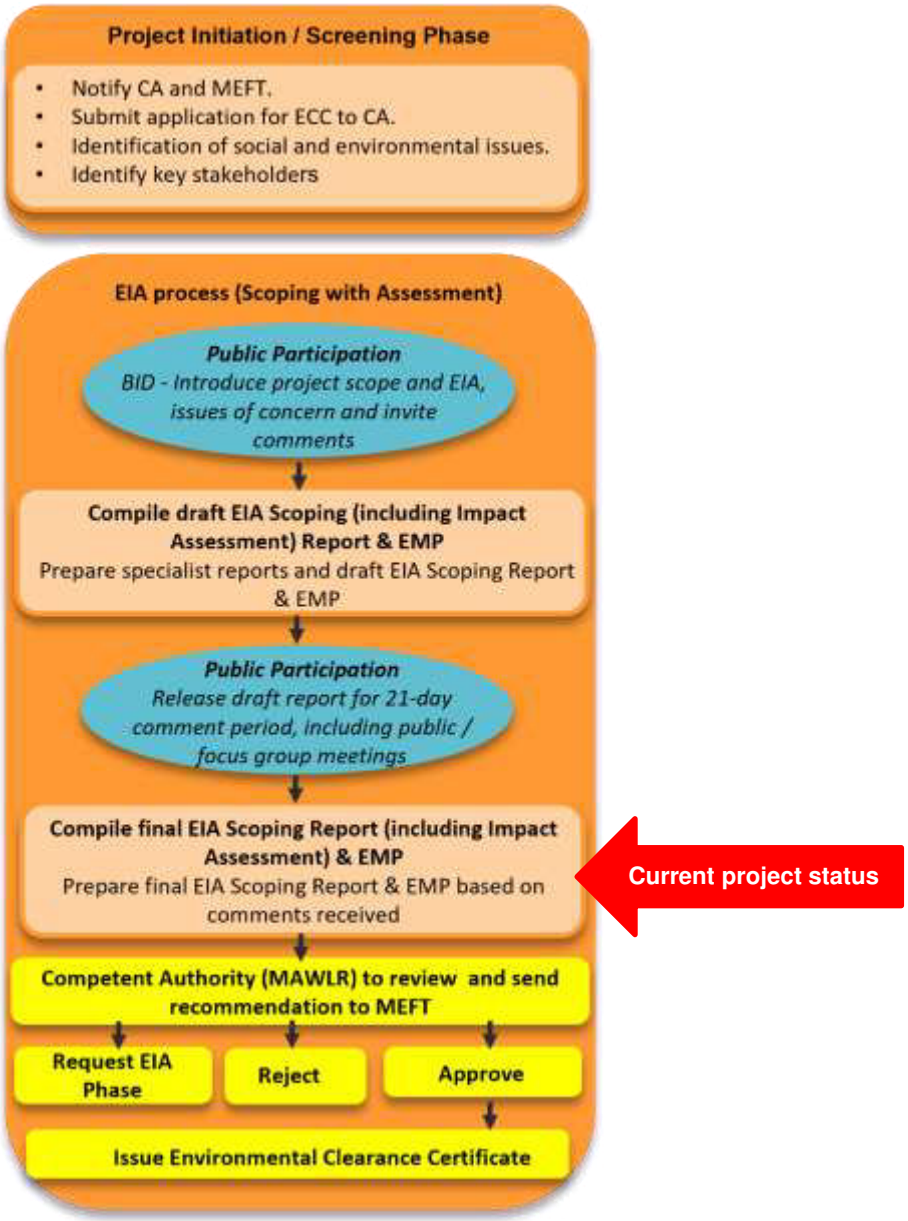

Figure 2: Illustration of the EIA process

The EIA process includes project initiation/ screening and application, scoping and impact assessment phases, as well as the compilation of an Environmental Management Plan (EMP) to ensure that the potential environmental and social impacts are avoided/ minimized, during the life of the Project.

The EIA regulatory process aims to:

- Notify I&APs about the proposed Project and EIA process and provide reasonable opportunity for involvement;
- Provide information on the project and its alternatives;
- Document the baseline environment that may be affected;
- Identify environmental and social aspects, in consultation with I&APs, and assess the potential impacts of the proposed project and its alternatives;
- Present appropriate management and mitigation or optimisation measures to avoid or minimise potential negative impacts or enhance potential benefits, respectively; and
- Allow for informed, transparent and accountable decision-making by the relevant authorities.

2.0 Project Description

2.1 Rationale for the Proposed Project

The current DFS mine infrastructure and plant designs indicate a daily water demand of 3 300 m^3/day or 1,1 Million m^3/a which is calculated based on the fact that it will initially cater for 5 Mtpa through put to sustain mining operations and related activities.

Various water supply options are being investigated to secure water supply to the Twin Hills Gold Mine, despite the success of the water supply investigations undertaken to date on the Karibib Marble Aquifer. The aim is to ensure water security and minimise potential impact of local sources owning to the fact that the Twin Hills Gold Mine project is located in the water scarce Central Areas of Namibia (CAN).

As such one of the options, Osino investigated and confirmed, is feasibility of abstracting groundwater from the Kranzberg Aquifer (KA). Based on the works completed to date, it is now known that the Kranzberg Aquifer has two sub-aquifers, namely the Kranzberg- and Aroab sub-aquifers covering a combined area of 2.29 km^2. A volume of approximately 700 000 m^3/annum is recharged to the 'Abstraction Area' from local runoff alone. Sustainable abstraction from the KA of 460 800 m^3/annum was recommended from five (5) recently drilled production boreholes. The volume was validated through a recharge study and groundwater numerical model developed for the aquifer.

This requires construction of a pipeline to transfer groundwater from boreholes in the aquifer via Karibib to the terminal reservoir on the Twin Hills Gold Mine site.

2.2 Project Components

It is proposed to construct a pipeline that will transfer groundwater from the Kranzberg Aquifer boreholes via Karibib to the terminal reservoir on the Twin Hills Gold Mine site. The pipelines would be laid underground with ND200 oPVC Class 12 and 16 pipes. The approximate lengths under consideration for the proposed pipelines are outlined in Table 1 below.

Table 1:Summary of Proposed Pipeline Routes

Pipeline Route	Approximate Length
Kranzberg to Karibib	A – 26.7 km
	B – 41.7 km
Karibib to Twin Hills	C – 21.2 km
	D – 21.5 km

3.0 Conclusion and Recommendations

3.1 Impact Assessment and Mitigation Summary

The impacts associated with the proposed project is presented in Chapter 8. The most significant impacts are related to the following:

- Destruction of vertebrate fauna, especially protected species: Trench operations and continuous vehicle movement along the service road(s), would result in the continued destruction of vertebrate fauna (i.e., especially slow-moving species) while open trenches left overnight would act as a giant pitfall trap for various vertebrates. The impact is assessed to be of **very low** significance after mitigation.
- Destruction of vegetation, especially protected species*:* The land clearing activities by mechanical methods along the pipeline route would result in protected tree species being eradicated. Vertebrate fauna (e.g., cavity dwellers such as bats, gallago, hornbills, parrots, various reptiles, etc. including various raptors e.g., eagles, vultures using such trees as perching/ roosting/ breeding) associated with these trees, especially the old/ large specimens, would be killed and/or displaced. The impact is assessed to be of **very low** significance after mitigation.
- Destruction of sensitive habitats: The land clearing activities by mechanical methods, along the pipeline route, would result in some sensitive habitats being destroyed and/or detrimentally affected. Vertebrate fauna and flora associated with these sensitive habitats, would be killed and/or displaced. The impact is assessed to be of **very low** significance after mitigation.
- Introduction and spread of alien invasive plant species: Invasive alien plant species would become established on disturbed areas and could also inadvertently continuously be transported into the area as seed on the various vehicles accessing the area. The impact is assessed to be of **low** significance after mitigation.
- Soil erosion: Typical pipeline operations, including continuous vehicle movement along the various access routes, would result in continued erosion issues if not

continuously maintained. The impact is assessed to be of **low** significance after mitigation.

The field assessment indicates that no archaeological or historical heritage sites will be affected in any way by the Project design as it currently stands. With a zero to extremely low probability of impact where the consequence of impact would be negligible, i.e. very low to low, the significance of impact is considered to be negligible. In terms of this assessment there would be no duration of impact and no extent of impact. From this it follows that with an unlikely/ improbable (Very Low) exposure to impacts the consequence of impact is expected to be insignificant, and the interpretation of significance is considered to be insignificant, or inconsequential and not requiring any consideration.

The management and mitigation measures are included in more detail in the Environmental Management Plan (EMP) (refer to Appendix F). To ensure compliance with the EMP it is recommended that an Environmental Control Officer (ECO) is appointed during construction.

3.2 Concluding Statement

The work undertaken in support of this ECC Application has been completed in line with the applicable regulatory framework. The assessment process followed included the undertaking of two specialist assessments deemed necessary to adequately identify and assess these potential impacts.

Following the impact assessment process, the identified residual impacts are assessed to be of **LOW** significance with the implementation of the recommended mitigation measures. The potential impacts can be adequately mitigated with the implementation of the proposed mitigation measures (as included in the EMP), which follows the principle of the mitigation hierarchy by firstly avoiding identified sensitive areas, and then reducing/ minimising the impact, and lastly rehabilitating disturbed sites.

Based on the findings of the EIA and associated specialist studies, SLR is of the opinion that this EIA Scoping Report and EMP is sufficiently robust and provides sufficient information for MAWLR and MEFT to make an informed decision on the proposed Project taking into consideration the significance of potential impacts.

SLR recommends that the commitments presented in the EMP should be conditional to the ECC, should MEFT approve the application.

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
Au	Gold
CFRD	Concrete Faced Rockfill Dam
CIL	Carbon in Leach
DEA	Directorate of Environmental Affairs
DFS	Definitive Feasibility Study
DSR	Draft Scoping Report
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
EHS	Environmental, Health, and Safety
EIA	Environmental Impact Assessment
EMA	Environmental Management Act, 2007 (No 7 of 2007)
EMP	Environmental Management Plan
EPFIs	Equator Principle Financial Institutions
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
FPIC	Free, Prior, and Informed Consent
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIIP	Good International Industry Practice
I&APs	Interested & Affected Parties
ICP	Informed Consultation and Participation
IFC	International Finance Corporation
ILO	International Labour Organization
ITCZ	Inter-Tropical Convergence Zone
LOM	Life of Mine
MAR	Managed Aquifer Recharge
MAWLR	Ministry of Agriculture, Water and Land Reform
MEFT	Ministry of Environment, Forestry and Tourism

Acronym/Abbreviation	Definition
MHSS	Ministry of Health and Social Services
MODVA	Ministry of Defence and Veteran Affairs
mtpa	million tons per annum
NIRP	National Integrated Resource Plan
NamWater	Namibia Water Corporation
Osino	Osino Gold Exploration and Mining (Pty) Ltd
PPP	Public Participation Process
PS	Performance Standards
RMF	Regional Maximum Flood
SANCOLD	South African National Committee on Large Dams
SCC	Species of Conservation Concern
SLR	SLR Environmental Consulting Namibia (Pty) Ltd
SWSSD	Surface Water and Sand Storage Dam
UN	United Nations
WRMA	Water Resources Management Act, 2013 (No. 11 of 2013)

1.0 Introduction

This chapter describes the purpose of this report, briefly describes the Project, summarises the legislative authorisation requirements, outlines the EIA process, and describes the structure of this Final Scoping Report.

1.1 Project Background

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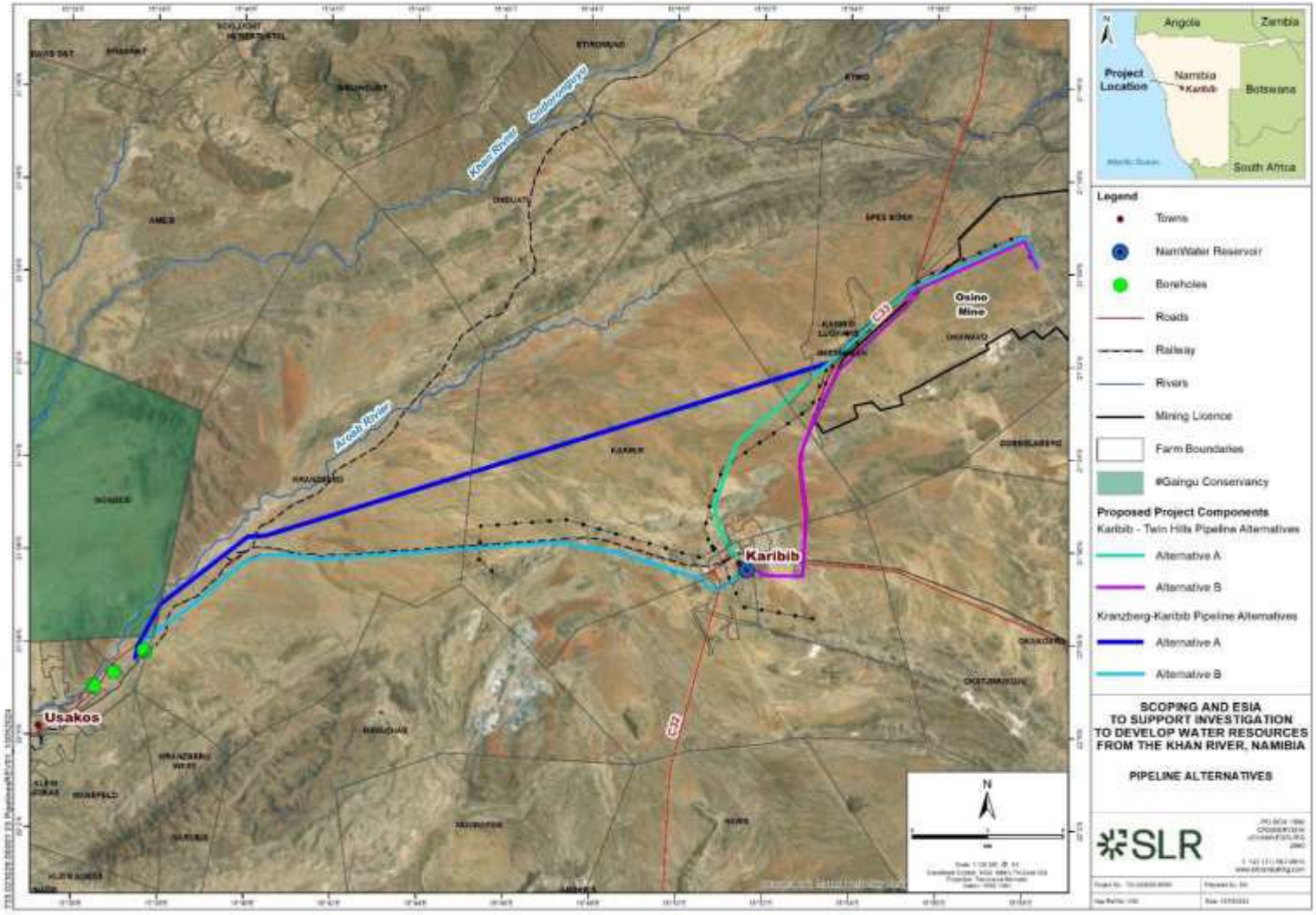
Khan River
Omdaungaya
Aroab River
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Karibib
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Alternative A
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SCOPING AND ESIA
TO SUPPORT INVESTIGATION
TO DEVELOP WATER RESOURCES
FROM THE KHAN RIVER, NAMIBIA
PIPELINE ALTERNATIVES
SLR

Figure 1-1: Locality of Project site

1.2 Introduction to the Environmental Impact Assessment Process

In Namibia, Environmental Impact Assessments are regulated by the DEA division of the MEFT in terms of EMA. This Act was gazetted on 27 December 2007 and the EIA Regulations were promulgated on 6 January 2012.

The EIA process is an interdisciplinary and multi-step procedure to ensure that environmental considerations are included in decisions regarding projects that may impact the environment (See Figure 1-2).

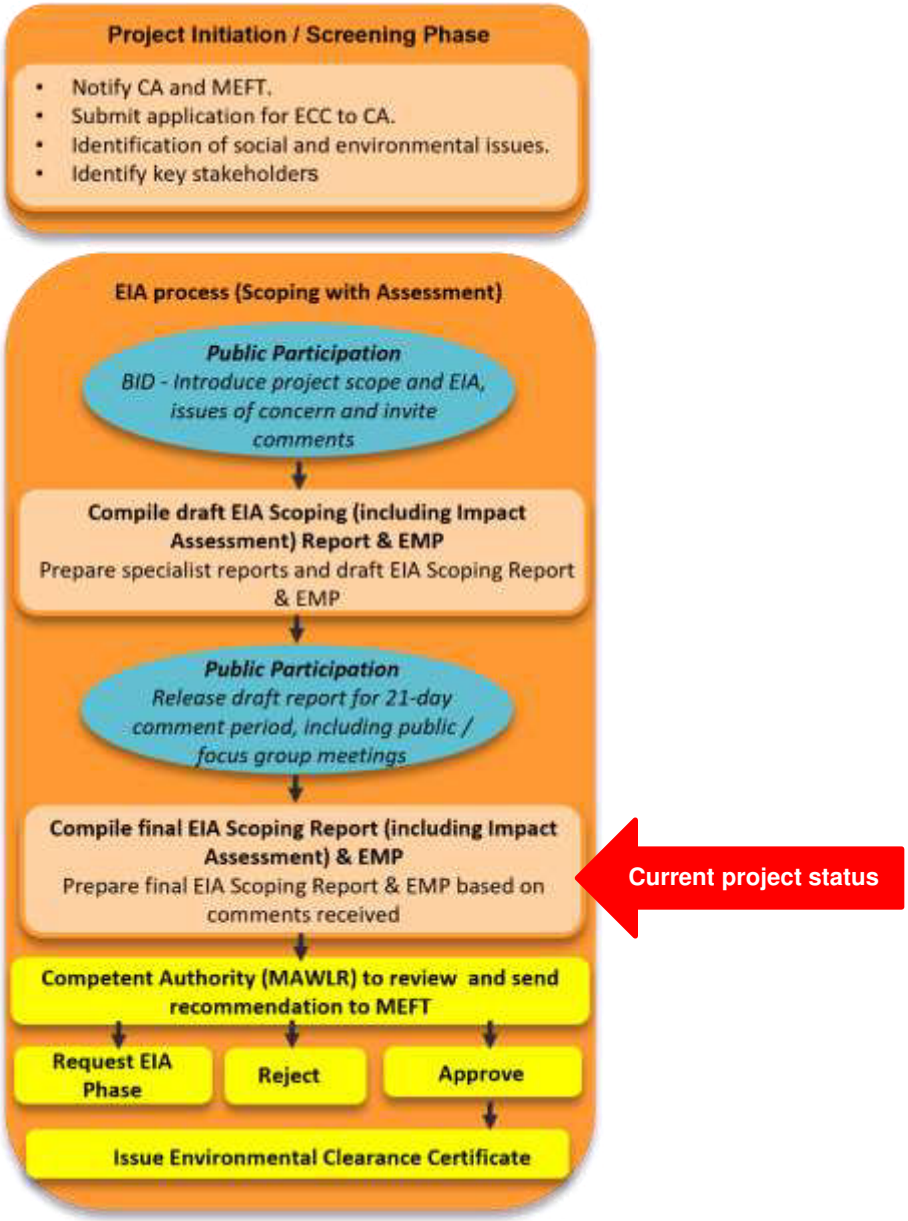

Figure 1-2: Illustration of the EIA process

The EIA process includes project initiation/ screening and application, scoping and impact assessment phases, as well as the compilation of an EMP to ensure that the potential environmental and social impacts are avoided/ minimized, during the life of the Project.

The EIA regulatory process aims to:

- Notify I&APs about the proposed Project and EIA process and provide reasonable opportunity for involvement;
- Provide information on the project and its alternatives;
- Document the baseline environment that may be affected;
- Identify environmental and social aspects, in consultation with I&APs, and assess the potential impacts of the proposed project and its alternatives;
- Present appropriate management and mitigation or optimisation measures to avoid or minimise potential negative impacts or enhance potential benefits, respectively; and
- Allow for informed, transparent and accountable decision-making by the relevant authorities.

1.3 Purpose of this Report

This Final EIA Scoping Report and EMP has been prepared in compliance with Section 8 and 15(2) of the EIA Regulations 2012 as part of the EIA that is being undertaken for the proposed Water Pipeline from the Kranzberg Aquifer boreholes via Karibib to Twin Hills Mine.

The compilation of this report has been informed by comments received from Interested and Affected Parties (I&APs) during the draft EIA Scoping Report review and comment period (6 February 2024 to 27 February 2024 (and further extended to 18 March 2024)) and those raised during the various public and focus group meetings held as part of the EIA process. Comments received by SLR have been recorded and responded to in a Comments and Responses Report (see Appendix C6 of the main report). **It should be noted that all significant changes to the draft report are underlined and in a different font (Times New Roman) to the rest of the text.**

This report is submitted to the competent authority, the Ministry of Agriculture, Water and Land Reform (MAWLR), for consideration and review. In terms of Section 32 of the Environmental Management Act, 2007 (No. 7 of 2007), MAWLR will then make a recommendation on the acceptance or rejection of the report to the MEFT: Directorate of Environmental Affairs, who will make the final decision on the ECC application.

1.4 Structure of this Report

This Scoping Report has been divided into various chapters and appendices, in compliance with Section 8 of the EIA Regulations, the contents of which are outlined in Table 1-1 below.

Table 1-1: Structure and Content of the Report

Section	Contents
Executive Summary	Provides a comprehensive synopsis of the Scoping Report.
Chapter 1	**Introduction** Provides a brief description of the project background, summarises the legislative authorisation requirements, summarizes the EIA process, describes the purpose of this report, describes the structure of the report and outlines the opportunity for comment.
Chapter 2	**Environmental Impact Assessment approach and methodology** Outlines the methodology for the assessment and consultation process undertaken during the EIA.
Chapter 3	**Environmental policy, planning and legislation** Outlines the key legislative requirements applicable to the proposed Project.
Chapter 4	**Project description** Provides an outline of the planned development infrastructure and the Project alternatives that have been identified for further consideration in the EIA process. Details the strategic context within which the project is framed and provides the motivation for the Project.
Chapter 5	**Description of the current environment** Describes the existing biophysical and socio-economic environment that could potentially be affected by the proposed Project and determines the relevant study area.
Chapter 6	**Methodology Used for the Assessment of Impacts** Presents the methodology used for assessing the impacts identified during the EIA process.
Chapter 7	**Description of the Environmental Impacts and Risks identified during Impact Assessment** Describes the potential impacts of the proposed Project.
Chapter 8	**Impact Assessment** Assesses the potential impacts significance of the proposed Project. Mitigation/ management measures are also presented.
Chapter 9	**Conclusion and Recommendations** Provides conclusions to the EIA and summarises the recommendations for the proposed Project.
Chapter 10	**References** Provides a list of the references used in compiling this report.

Section	Contents
Appendices	Appendix A: Curriculum vitae of EIA Project Team
	Appendix B: Copy of Environmental Clearance Certificate application form
	Appendix C: Stakeholder Engagement Documents
	Appendix C1: I&AP Database
	Appendix C2: Notification Letters
	Appendix C3: Newspaper Advertisement
	Appendix C4: Site Notice
	Appendix C5: Meeting Minutes, Presentation and Attendance Registers
	Appendix C6: Comments and Responses Report
	Appendix D: Impact Assessment Methodology
	Appendix E: Specialist Studies
	Appendix F: Environmental Management Plan

1.5 Opportunity to Comment

The Draft Scoping Report and EMP was distributed from **6 February 2024 to 27 February 2024 (further extended until 18 March 2024)** to provide I&APs with an opportunity to comment on any aspect of the proposed project and the findings of the EIA process to date. Copies of the full report were made available on the SLR website (at https://www.slrconsulting.com/en/public-documents/) and at the following locations:

Name of Facility	Physical Address and tel.
Karibib Community Library	Hidipo Hamutenya Road, Karibib Tel: (064) 530602
Usakos Community Library	Theo Ben Gurirab Street, Usakos Tel: (064) 530099
Omaruru Community Library	Wilhelm Zeraua Road, Omaruru Tel: (064) 570057

Comments received by SLR at the address, telephone/ fax numbers or e-mail address shown on or before **18 March 2024** was included in this final EIA Scoping Report and EMP.

SLR Environmental Consulting (Namibia) (Pty) Ltd
Attention: Stephanie Strauss
Postal Address: 8 General Murtala Muhammed Ave, Eros Windhoek
Tel: 061 231 287
E-mail: osino-water@slrconsulting.com
SLR Website: https://www.slrconsulting.com/en/public-documents/

2.0 ENVIRONMENTAL IMPACT ASSESSMENT APPROACH AND METHODOLOGY

This chapter provides the details of the EIA Project Team, describes the EIA process and methodology, and outlines the EIA assumptions and limitations.

2.1 EIA Process Overview

The EIA process consists of a series of steps to ensure compliance with the objectives and the EIA Regulations, commencing formally with the Scoping Phase. The process involves an open, participatory approach to ensure that impacts are identified, and that decision-making takes place in an informed, transparent and accountable manner.

The EIA process for the Project is being undertaken as a Scoping with assessment process. A summary of the approach, key steps and corresponding activities in each phase of the EIA process are outlined in the following Sections.

2.2 EIA Project Team

SLR has been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the required EIA process for the proposed water pipeline from the Kranzberg Aquifer boreholes via Karibib to the Osino mine. The details of the team including EAPs and specialists undertaking the EIA process are provided in Table 2-1.

Table 2-1: Overview of the EAP Team

Details			
EIA Team			
Name of the practitioner	Edward Perry	Sharon Meyer	Stephanie Strauss
Responsibility on the project	Technical review	Project director	Project manager and EAP
Tel No.:	+264 61 231 287	**Fax No.:**	+264 61 231 289
Postal address.:	PO Box 86386, Windhoek		
E-mail address	osino-water@slrconsulting.com		
Environmental and Social Specialists			
Aspect	**Consultant**		**Name**
Archaeology	Dr John Kinahan		Dr John Kinahan
Terrestrial Ecology	Environment and Wildlife Consulting Namibia		Peter Cunningham

Curriculum Vitae of the EIA Team are included in Appendix A.

Edward Perry
SLR Consulting – EMPA Operations Manager
Technical review
Ed Perry has more than 20 years of experience in international ESIAs. He has worked on a wide range of projects within the public and private sector within Africa and Europe. Ed is a registered Environmental Auditor with the Institute for Environmental Management and Assessment and a Lead Auditor with the International Cyanide Management Institute. Ed has been Project Director of EIAs within Africa for a wide range of facilities, including mining, infrastructure, oil and gas and power generation. Ed is a registered EAP with the Environmental Assessment Practitioner Association of South Africa.

Sharon Meyer
SLR Consulting – Associate Environmental Consultant
Project director
Sharon has over 22 years of experience as an environmental scientist and project manager. She has managed complex projects within the mining and power generation sectors, with a focus on industrial waste management. Sharon has managed multi-national and multi-disciplinary teams on environmental and social due diligence projects in Africa.
Sharon has worked on a variety of authorisation and auditing processes within the mining sector including diamond, coal, iron ore, gold, vanadium, copper, manganese, nickel and platinum, as well as tailings reclamation projects. Sharon has managed multi-disciplinary and multi-national teams on mining projects within Africa. Her focus has been on the progress of mining implementation from prospecting through to mine closure, including closure options and closure costs in line with the relevant country financial provisioning regulations.

Stephanie Strauss
SLR Consulting – Associate Environmental Consultant
Project manager and Environmental Assessment Practitioner
Stephanie is a Senior Environmental Consultant with SLR and has nine years of experience as an EAP within the environmental consulting field in Namibia. Stephanie has been involved in several EIAs for projects in various sectors. Stephanie has worked on a variety of authorisation and auditing processes within various sectors. Key projects experience includes Environmental Assessments for urban development projects, road rehabilitation, telecommunication, waste management, and infrastructure development, mining and exploration projects. She has conducted numerous public participation and stakeholder engagement activities relevant to the projects. Stephanie also has experience in environmental compliance monitoring and auditing for projects.

2.3 Screening, Project Initiation and Application Phase

The Screening phase for the Project has been completed. This phase of the study included the following tasks:

- Project inception and initiation meetings held between SLR and the Osino Teams;
- Early identification of environmental and social aspects and potential impacts associated with the proposed project activities at alternative sites;
- Identification of key stakeholders to be involved in the EIA Scoping process; and

- Confirming the following:
  - the list of activities, according to the EMA, that may not be undertaken without an ECC;
  - the approach to stakeholder engagement; and
  - the Scoping phase requirements.

Based on the outcome of the Screening Phase, SLR compiled the "Application for Environmental Clearance" and submitted this both as a hard copy (with revenue stamp) and electronically via the MEFT portal (please see Appendix B for a copy).

2.4 Specialist Studies and Site Visit

Two specialist studies were conducted to address the key issues associated with the proposed Project. These included (1) Terrestrial Ecology Assessment and (2) Archaeological Assessment. The terms of reference of these studies are presented in Section 7.2.1 and 7.2.3.

2.5 Compilation and Review of Draft EIA Scoping Report and EMP

This Final Scoping EIA Report and EMP has been prepared in compliance with Section 8 and 15(2) of the EIA Regulations 2012. The specialist findings and other relevant information have been integrated into this final report.

The draft report was released for a 21-day review and comment period which was further extended as per the request of I&APs (see Section 1.5 for details).

The objective of the review period was to ensure that I&APs are notified about the proposed Project, given a reasonable opportunity to provide comments on the findings of the EIA process. Steps that have been undertaken as part of this review process are summarised in Section 2.8.2.

2.6 Completion of the EIA

The following steps were undertaken following the review period of the EIA process:

- After closure of the comment period on the Draft Scoping EIA Report and EMP, the draft report was updated into this Final Scoping EIA Report and EMP. All comments received were incorporated and responded to in an updated Comments and Responses Report, which is appended to this final report (Appendix C6).
- The Final Scoping EIA Report and EMP will be submitted to MAWLR for consideration and review. MAWLR will then forward it with a recommendation to MEFT for a decision on the ECC application. The decision taken by MEFT will be distributed to all I&APs registered on the Project database for information purposes.

2.7 Assumptions and limitations

The assumptions and limitations pertaining to this EIA process are listed below:

- SLR assumes that all relevant project information has been provided and that it was correct and valid at the time it was provided.

- No significant changes to the project description or surrounding environment between the completion of the EIA process and implementation of the proposed Project that could substantially influence findings and recommendations with respect to mitigation and management will occur.

2.8 Public Participation Process

The Public Participation Process (PPP) for this EIA aims to ensure that all stakeholders that may be affected by, or are interested in, the proposed Project are informed of the Project and its EIA process and can register their views and concerns. Building from there, the PPP provides opportunities to influence the project design so that its benefits can be maximised and potential negative impacts be avoided or minimised.

2.8.1 Stakeholders

Stakeholders included in the Project I&AP database to date include (Table 2-2):

Table 2-2: Project Stakeholders

No.	Stakeholder
1.	Ministry of Environment, Forestry and Tourism (MEFT)
2.	MEFT: Department of Environmental Affairs
3.	Ministry of Mines and Energy (MME):
4.	MME: Mines Directorate
5.	Ministry of Agriculture, Water and Land Reform (MAWLR)
6.	Ministry of Regional and Local Government, Urban and Rural Development
7.	Ministry of Industrialisation, Trade and SME (Small and Medium Enterprise) Development
8.	Ministry of Works and Transport
9.	Ministry of Defence and Veteran Affairs (MODVA)
10.	NamWater
11.	NamPower
12.	National Heritage Council of Namibia
13.	Namibia Roads Authority
14.	Namibia Chamber of Environment
15.	Karibib Town Council
16.	Usakos Town Council
17.	Omaruru Municipality
18.	Affected Farmers
19.	Upper Swakop Basin Management Committee
20.	Wildlife Society of Namibia
21.	Namibia Scientific Society
22.	Earthlife Namibia
23.	Namibia Nature Foundation
24.	National Botanical Research Institute

2.8.2 Steps In the Consultation Process

The steps in the consultation process during the Scoping Phase are indicated in Table 2-3.

Table 2-3: Consultation Process with I&APs and Authorities

Task	Description	Date
Notification - regulatory authorities and I&APs		
I&AP identification	I&APs were identified and contact details obtained where possible through site visits/ meetings with certain key stakeholders, telephone calls and using databases from other EIAs conducted by SLR across Namibia and previous engagements by Osino. A copy of the I&AP database is attached in Appendix C1. The process of identifying additional I&APs will be ongoing throughout the EIA.	Dec 2023/Jan 2024
Notification of Draft Scoping Report Availability for Public Review	EIA Notification letters were distributed electronically (where possible) to all I&APs on the database of the availability of the draft Scoping EIA Report for review and comment. Bulk text messages were being sent to I&APs without email addresses. Copies of the Executive Summary of the Draft Scoping EIA Report were also made available on request by SLR and was made available on the SLR website. Electronic copies of the full report were available on the SLR project website (https://www.slrconsulting.com/en/public-documents) and on request to SLR (on a CD and email). Hard copies of the full report were available at the following locations for review: • Karibib Public Library • Usakos Public Library • Omaruru Public Library Authorities and I&APs were provided access to the Scoping Report for review and comment and could submit comments in writing to SLR Consulting. The comment period ended on the **18 March 2024.**	Jan - March 2024
Newspaper Advertisements	Block advertisements were placed on 30 January and 5 February 2024 as follows: • Allgemeine Zeitung • The Namibian Sun • Republikein The newspaper advertisements provided information of the proposed Project, the availability of the Draft Scoping EIA Report and the date, time and venues of the planned public meetings. Copies of the advertisements are attached in Appendix C3 of this Final Scoping Report.	Jan 2024
Scoping phase meetings and submission of comments		
Focus group meetings	Additional focus group meetings with key stakeholders were hosted as part of the public participation for the EIA. The key stakeholders include:	Jan 2024

Task	Description	Date
	• Karibib Town Council • Farmers within the Project area Minutes of these meetings are attached in Appendix C5 to this Final Scoping Report.	
Public Meetings	Public meetings were held as follows: • Karibib: (6 February, 14:00, Karibib Town Hall) • Usakos: (6 February, 18:00, Usakos Town Hall) • Omaruru: (7 February, 12:00, Usakos Town Hall) The presentation and minutes of the meetings are attached in Appendix C5 of this Final Scoping EIA Report.	Feb 2024
Comments and Responses	Minutes of the meetings and all comments received are recorded and responded to. These are documented in the Comments and Responses Report that is attached in Appendix C6 in the Final Scoping EIA report.	March/ April 2024

3.0 ENVIRONMENTAL POLICY, PLANNING AND LEGAL FRAMEWORK

This chapter provides an overview of relevant Namibian legislation and policy, summarises the Namibian administrative framework and describes the international treaties, industry standards and guidelines applicable to the EIA process for the Project. In accordance with the EIA Regulations (2012), all legislation and guidelines that have been considered in the EIA process must be documented.

3.1 Namibian Institutional and Administrative Structure

3.1.1 Introduction

The Namibian Constitution makes provision for the creation and enforcement of applicable legislation. Namibia has five tiers of law which include the following:

- The Constitution;
- Statutory law;
- Common law;
- Customary law; and
- International law.

At Independence in 1990, the Government of the Republic of Namibia recognized the importance of the environment, by including the protection of natural resources in the Constitution. Within this context, and in accordance with the Constitution, Namibia has passed numerous laws intended to protect the natural environment and to mitigate against adverse environmental impacts.

Several of the Acts, as well as various policies, are relevant to the Project. This section details the institutional framework responsible for implementing the relevant legislation (described in Section 3.2).

3.1.2 Ministry of Environment, Forestry and Tourism

The mission of the MEFT is to promote biodiversity conservation in the Namibian environment through the sustainable utilization of natural resources and tourism development for the maximum social and economic benefit of its citizens. MEFT develops, administers and enforces environmental legislation and policy.

The MEFT's DEA is mandated to give effect to Article 95L of the Constitution by promoting environmental sustainability. The Environmental Commissioner serves as head of the DEA. The DEA is responsible for, inter alia, the administration of the EIA process undertaken in terms of the Environmental Management Act, 2007 and the EIA Regulations 2012.

The DEA will be responsible for issuing a decision on the application for an ECC, based on the recommendations from MAWLR: Directorate of Water Resource Management. If approved, the DEA will issue an ECC.

3.1.3 Ministry of Agriculture, Water and Land Reform

The Ministry of Agriculture, Water and Land Reform (MAWLR) has as its mission the realization of the potential of the Agricultural, Water and Land Reform sectors towards the promotion of an efficient and sustainable socio-economic development for a prosperous Namibia. The MAWLR is mandated to promote, develop, manage and utilize Agricultural and Water resources.

The MAWLR is the Competent Authority with regards to the water resources under consideration for the Project. On conclusion of the EIA process, MAWLR is required to make a recommendation to MEFT on the application for Environmental Clearance, who will make the final decision.

3.1.4 Namibia Water Corporation

The Namibia Water Corporation (NamWater) is a key stakeholder and water resource developmental partner in the Project and the EIA process. NamWater supplies water in bulk to industries, government institutions, municipalities, local authorities, commercial entities, such as mines, and to the Directorate of Water Supply and Sanitation in the MAWLR. The Directorate in turn supplies water to rural communities.

NamWater is a commercialized water entity, wholly owned by the Government of the Republic of Namibia. NamWater's mandate is to provide quality water and related services to the satisfaction of all stakeholders, taking cognizance of the environment, scarcity of and dependency of all on water. The Board of Directors ensures that NamWater utilizes the scarce water resources in the best interests of Namibia and the Namibian People.

3.2 Namibian Legal Framework

The following sections outlines the legislative, policy and regulatory framework relevant to undertaking an EIA in accordance with the EIA Regulations 2012. It is however noted that the following is not an exhaustive list of all legislation and compliance with additional statutes may be required.

3.2.1 The Constitution of the Republic of Namibia (1990)

Article 91 defines the function of the Ombudsman and, 91 (c) describes the duty to investigate complaints concerning the over-utilisation of living natural resources, the irrational exploitation of non-renewable resources, the degradation and destruction of ecosystem and failure to protect the beauty and character of Namibia.

Article 95 (l) of the Constitution of the Republic of Namibia states that *"the State shall actively promote and maintain the welfare of the people by adopting, inter alia, policies aimed at … maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of natural resources on a sustainable basis for the benefit of all Namibians both present and future; in particular the Government shall provide measures against the dumping or recycling of foreign nuclear and toxic waste on Namibian Territory."*

Article 100 states "that the land, water and natural resources below and above the surface of the land … shall belong to the State if they are not otherwise lawfully owned."
Article 101 of the Namibian Constitution further states that the principles embodied within the constitution "*shall not of and by themselves be legally enforceable by any court, but shall nevertheless guide the Government in making and applying laws. … The courts are entitled to have regard to the said principles in interpreting any laws based on them."*

The constitutional recognition of environmental concerns triggered widespread legislative reform relating to the management of natural resources in Namibia. The country's environmental protection effort is currently comprised of the EMA and its Regulations (2012).

3.2.2 Namibia's Environmental Impact Assessment Policy, 1995

The EIA Policy of 1995 promotes accountability and informed decision making through the requirement of EIAs for listed programmes and projects (activities). The EIA Policy is currently enforced through the EMA and the EIA Regulations of January 2012. Refer to the following sections.

3.2.3 Environmental Management Act, 2007

The EMA was promulgated in December 2007 and came into effect on 6 February 2012. Part 1 of the EMA describes the various rights and obligations that pertain to citizens and the Government. The main objectives of the Act are to ensure that:

- Significant effects of activities on the environment are considered carefully and timeously;
- There are opportunities for timeous participation by I&APs throughout the assessment process; and
- Findings are taken into account before any decision is made in respect of activities affecting the environment.

Part 2 of the EMA sets out a number of principles of environmental management which give effect to the provisions of the Constitution for integrated environmental management. Decision-makers must take these principles into account when deciding whether or not to approve a proposed project. In terms of this legal framework certain identified activities may not commence without an environmental clearance (or amendment thereto) that is issued by the office of the environmental commissioner in the MEFT.

3.2.4 Environmental Impact Assessment Regulations, 2012

The EIA Regulations, promulgated in January 2012 in terms of Section 56 of the EMA provides for the control of certain listed activities. These listed activities are provided in GN No. 29 and are prohibited until an ECC has been obtained from MEFT. Such ECCs, which may be granted subject to conditions, will only be considered once there has been compliance with the EIA Regulations 2012 published in GN No. 30. These EIA Regulations sets out the procedures and documentation that need to be complied with in undertaking an EIA process.

Osino are applying in terms of the EMA for an ECC for activities relating to the development of the water pipeline proposed from the Kranzberg Aquifer boreholes via Karibib to the Osino

mine. The following activities identified in the regulations apply to the proposed project (See Table 3-1):

Table 3-1:Listed activities triggered by the Project

Activity	Project component
10. Infrastructure	
10.1 The construction of (a) oil, water, gas and petrochemical and other bulk supply pipelines.	The Project includes the construction of a water pipeline.

3.2.5 Water Resources Management Act

The Water Resources Management Act, 2013 (No. 11 of 2013 (WRMA)) provides a framework for the management, development, protection, conservation and use of water resources in a sustainable manner.

The commencement of the WRMA was published in the Government Gazette on 29 August 2023 in Government Notice No. 8187, confirming the commencement of the new Act.

Relevant principles of the Act include, inter alia:

- Equitable access for all people to safe drinking water is an essential basic human right to support a healthy productive life;
- Harmonisation of human water needs with the requirements of environmental ecosystems and the species that depend on them, while recognising that the water resource quality for those ecosystems must be maintained;
- Promotion of the sustainable development of water resources based on an integrated water resources management plan which incorporates social, technical, economic, and environmental issues;
- Development of the most cost-effective solutions, including conservation measures, to infrastructure for the provision of water; and
- Promotion of water awareness and the participation of persons having interest in the decision-making process should form an integral part of any water resource development initiative.

3.2.6 Other Relevant Namibian Legislation

Table 3-2 below provides a summary of other relevant environmental and social legislation considered in the preparation of this Scoping Report.

Table 3-2: Other applicable Namibian legislation

Sector	Law	Key Provisions and Relevance to the Project
Transport	Road Traffic and Transport Act, 1999 (No. 22 of 1999)	This Act provides for the control of traffic on public roads, the licensing of drivers, the registration and licensing of vehicles, and the control and regulation of road transport across Namibia's borders.

Sector	Law	Key Provisions and Relevance to the Project
		Vehicles supplying goods and services to the Project during construction and operation will have to comply with the requirements of the Act.
Pollution/ Waste	Pollution Control and Waste Management Bill (3rd Draft September 2003)	This Bill promotes sustainable development and provides for the prevention and regulation of the discharge of pollutants to the air, water and land; regulation of noise, dust and odour pollutions; and the establishment of a system of waste planning and management. Hazardous and non-hazardous waste will be generated during all Project phases and consideration should be given of the requirements of the bill.
	Atmospheric Pollution Prevention Ordinance (Ordinance 11 of 1976)	This Act provides for the prevention of the pollution of the atmosphere. Construction activities, creating dust near third parties needs to be controlled in terms of the requirements of the Act.
Environmental/ Conservation/ Land	National Heritage Act, 2004 (No. 27 of 2004)	This Act provides for, inter alia, the protection and conservation of places and objects of heritage significance. A National Heritage Council has been established to identify, conserve, manage, and protect places and objects of heritage significance. Permits are required for the removal, damage, alteration or excavation of heritage sites or remains. Any person who discovers an archaeological site should notify the National Heritage Council. These aspects could be relevant during the construction activities of the proposed project and will require to be assessed.
	National Monuments Act 1969 (No.28 of 1969)	This Act establishes a National Monuments Council and provides for the preservation of certain property as National Monuments and the maintenance of certain burial grounds.
	Nature Conservation Ordinance, 1975 (No. 4 of 1975)	This Ordinance consolidates and amends the laws relating to the conservation of nature; the establishment of game parks and nature reserves; and the control of problem animals. The Ordinance is expected to be replaced by the Wildlife and Protected Areas Management Act in the near future (latest draft 2018).
	Soil Conservation Act. 1969 (No. 76 of 1969)	The Act makes provision for the prevention and control of soil erosion and the protection, improvement and conservation of soil, vegetation and water supply sources and resources, through directives declared by the Minister. Care is to be taken in identifying any potential impacts on soil, vegetation, water supply sources and resources by firstly trying to avoid these impacts. Where they can't be avoided, management measures should be implemented to reduce the significance of the impact(s).
	Inland Fisheries Resources Act, 2003 (No. 1 of 2003)	Conservation and protection of aquatic ecosystems.
Labour	Labour Act, 2007 (No. 11 of 2007) and its	These Acts stipulate, amongst other things, sound labour relations, employment equity, fair employment practices,

Sector	Law	Key Provisions and Relevance to the Project
	amendment: No. 2 of 2012	training, minimum basic conditions of service, workplace health and safety and retrenchment. Compliance is enforced and monitored by the Ministry of Labour through the office of the Labour Commissioner.
	Social Security Act, 1994 (No. 34 of 199, as amended	
	Employees Compensation Act, 1995 (No. 5 of 1995)	
	Regulations relating to the health and safety of employees at work (GN 156 of 1997)	These Regulations establish health and safety regulations for the workplace.
	Affirmative Action (Employment) Act, 1998 (No. 29 of 1998)	This Act aims to achieve equal opportunity in employment by redressing, through appropriate affirmative action plans, the conditions of disadvantage in employment experienced by persons in designated groups arising from past discriminatory laws and practices.

3.2.7 Other Relevant Namibian Policies

The scope of this report is designed to comply with the requirements of the EMA and the EIA Regulations. It is however noted that several other policies, plans and statutes are potentially applicable to the implementation of the Project, including (but not limited to):

- Labour Act, 2007;
- Local Authorities Act, 1992;
- Namibia's Environmental Assessment Policy for Sustainable Development and Environmental Conservation (1994);
- National Development Plan 5;
- National Integrated Resource Plan (NIRP 2016);
- National Land Policy, the National Resettlement Policy, the Agricultural (Commercial)
- National Industrial Policy (2012);
- Policy for the Conservation of Biotic Diversity and Habitat Protection (1994);
- National Policy on Human Wildlife Conflict management (2009);
- Namibia's Climate Change Policy;
- The Namibia Vision 2030; and
- The Harambee Prosperity Plan (2021 -2025).

3.2.8 International Conventions

Relevant international conventions to which Namibia is a signatory are summarised below:

- Convention on Biological Diversity, 1992;
- United Nations Framework Convention on Climate Change, 1992;
- The Convention on International Trade in Endangered Species (CITES) of 1973;
- Convention to Combat Desertification 1994;
- National Rangeland Management Policy and Strategy of 2012;
- National Biodiversity Strategy and Action Plan 1 and 2 (draft);
- Vienna Convention for the protection of the ozone layer (1985);
- Montreal Protocol on substances that deplete the ozone layer (1987);

- United Nations Convention on Biological Diversity (UNCBD); and
- United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) 2007.

3.3 Overview of Relevant International Standards

Development of the proposed Project is likely to be primarily financed through official development assistance from the international finance institutions.

3.3.1 The Equator Principles

The Equator Principles are a risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risk in projects and are primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making. Equator Principle Financial Institutions (EPFIs) commit to implementing the Equator Principles in their internal environmental and social policies, procedures and standards for financing projects and will not provide Project Finance or Project-Related Corporate Loans to projects where the client will not, or is unable to, comply with the Equator Principles.

To facilitate potential access to funding for project development potential borrowing organisations need to consider the Equator Principles and environmental and social risk management as part of the EIA process. There are ten (10) principles as shown below, and these require that Projects conduct an EIA process in compliance with the IFC Performance Standards on Environmental and Social Sustainability.

Principle
1. Review and categorisation Establishes the need for the EPFI to categorise the project based on the magnitude of its potential environmental and social risks and impacts as part of its internal environmental and social review and due diligence.
2. Social and environmental assessment Requires the client to conduct an Assessment process to address, to the EPFI's satisfaction, the relevant environmental and social risks and impacts of a proposed Project. It is required that the Assessment documentation will propose measures to minimize, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of the proposed project.
3. Applicable environmental and social standards Established that the Assessment process should firstly address compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues.
4. Environmental and Social Management System and Equator Principles Action Plan Requires an Environmental and Social Management Plan (ESMP) to be prepared by the client to address issues raised in the assessment process and incorporate actions required to comply with the applicable standards.
5. Stakeholder engagement Requires clients to demonstrate effective Stakeholder Engagement as an ongoing process in a structured and culturally appropriate manner with affected communities and, where relevant, other stakeholders.
6. Grievance mechanism

Principle
Requires the client to establish a grievance mechanism designed to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance as part of the ESMS.
7. Independent review Requires that an Independent Environmental and Social Consultant, not directly associated with the client, will carry out an independent review of the assessment documentation, including EMPs process documentation to assist the EPFI's due diligence, and assess Equator Principles compliance.
8. Covenants Requires that the client pledge its commitment to complying with all relevant host country environmental and social laws, regulations and permits in all material respects in the financing documentation.
9. Independent monitoring and reporting Requires the appointment of an Independent Environmental and Social Consultant or requires that the client retain qualified and experienced external experts to verify its compliance with the Equator Principles and monitoring information which would be shared with the EPFI.
10. Reporting and transparency Deals with the client's reporting requirements in addition to the disclosure requirements in Principle 5. This principle states that the client will ensure that, at a minimum, a summary of the EIA is accessible and available online and the client will publicly report Greenhouse Gas (GHG) emission levels (combined Scope 1 and Scope 2 Emissions) during the operational phase for Projects emitting over 100 000 tonnes of CO_2 equivalent annually.

3.3.2 International Finance Corporation Performance Standards

The International Finance Corporation (IFC) has adopted eight (8) Performance Standards (PS) on Social and Environmental Sustainability to manage social and environmental risks and impacts and to enhance development opportunities.

PS 1 establishes the importance of:

i. Integrated assessment to identify the environmental and social impacts, risks, and opportunities of projects;
ii. Effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and
iii. The client's management of environmental and social performance throughout the life of the project.

PS 2 - 8 establish objectives and requirements to avoid, minimize, and where residual impacts remain, to compensate/ offset for risks and impacts to workers, affected communities, and the environment. While all relevant environmental and social risks and potential impacts should be considered as part of the assessment, PS 2 to 8 describe potential environmental and social risks and impacts that require particular attention. Where environmental or social risks and impacts are identified, the client is required to manage them through its Environmental and Social Management System (ESMS) consistent with PS 1.

Several cross-cutting topics such as climate change, gender, human rights, and water, are addressed across multiple Performance Standards.

IFC PS 1: Assessment and Management of Environmental and Social Risks and Impacts

PS 1 applies to all projects that have environmental and social risks and impacts. It underscores the importance of managing environmental and social performance throughout the life of a project.

The objectives of PS 1 are:

- To identify and evaluate environmental and social risks and impacts of the project.
- To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize, and, where residual impacts remain, compensate/ offset for risks and impacts to workers, affected communities, and the environment.
- To promote improved environmental and social performance of clients through the effective use of management systems.
- To ensure that grievances from affected communities and external communications from other stakeholders are responded to and managed appropriately.
- To promote and provide means for adequate engagement with affected communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated.

The development and operation of the proposed Project presents a risk to both the social and biophysical environments. As a result, undertaking an EIA is critical to complying with this PS.

IFC PS 2: Labour and Working Conditions

PS 2 acknowledges that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers. The requirements set out in PS 2 have been in part guided by several international conventions and instruments, including those of the International Labour Organization (ILO) and the United Nations (UN).

The objectives of PS 2 are:

- To promote the fair treatment, non-discrimination, and equal opportunity of workers.
- To establish, maintain and improve the worker-management relationship.
- To promote compliance with national employment and labour laws.
- To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain.
- To promote safe and healthy working conditions, and the health of workers.
- To avoid the use of forced labour.

Workers will be employed particularly during the construction phase of the Project, thus triggering this PS.

IFC PS 3: Resource Efficiency and Pollution Prevention

PS 3 recognizes that increased economic activity and urbanization often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels.

There is also a growing global consensus that the current and projected atmospheric concentration of GHG threatens the public health and welfare of current and future generations. PS 3 outlines a project-level approach to resource efficiency and pollution prevention and control in line with internationally disseminated technologies and practices. In addition, it promotes the ability of private sector companies to adopt such technologies and practices as far as their use is feasible in the context of a project that relies on commercially available skills and resources.

The objectives of PS 3 are:

- To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities.
- To promote more sustainable use of resources, including energy and water.
- To reduce Project-related GHG emissions.

This standard has potential relevance to the Project scope.

IFC PS 4: Community Health, Safety, and Security

Performance Standard 4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. While acknowledging the public authorities' role in promoting the health, safety, and security of the public, PS 4 addresses the client's responsibility to avoid or minimize the risks and impacts to community health, safety, and security that may arise from project related-activities, with particular attention to vulnerable groups.

The objectives of PS 4 are:

- To anticipate and avoid adverse impacts on the health and safety of the affected community during the project life from both routine and nonroutine circumstances.
- To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the affected communities.

Community health, safety and security will be a topic during all phases of the Project.

IFC PS 5: Land Acquisition and Involuntary Resettlement

PS 5 recognizes that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or

other means of livelihood) as a result of project-related land acquisition and/ or restrictions on land use.

The objectives of PS 5 are:

- To avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs.
- To avoid forced eviction.
- To anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by:
  - providing compensation for loss of assets at replacement cost; and
  - ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected.
- To improve, or restore, the livelihoods and standards of living of displaced persons
- To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.

IFC PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

PS 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. The requirements set out in PS 6 have been guided by the Convention on Biological Diversity.

The objectives of PS 6 are:

- To protect and conserve biodiversity.
- To maintain the benefits from ecosystem services.
- To promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.

A Terrestrial biodiversity assessment is included as part of the Scoping Report (refer to Section 7.2).

IFC PS 7: Indigenous Peoples

PS 7 recognizes that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development.

The objectives of PS 7 are:

- To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples.

- To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts.
- To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner.
- To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life-cycle.
- To ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present.
- To respect and preserve the culture, knowledge, and practices of Indigenous Peoples.

No risks to indigenous people have been identified. This PS is not applicable.

IFC PS 8: Cultural Heritage
PS 8 recognizes the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, PS 8 aims to ensure that clients protect cultural heritage during their project activities. In addition, the requirements of this PS on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity.

The Objectives of PS 8 are:

- To protect cultural heritage from the adverse impacts of project activities and support its preservation.
- To promote the equitable sharing of benefits from the use of cultural heritage.

Earthworks and construction activities could pose a risk to cultural heritage. This Performance Standard is triggered. An Archaeological Impact Assessment is included as part of the Scoping Report (refer to Section 7.2).

3.3.3 IFC Environmental Health and Safety Guidelines

World Bank Group Environmental, Health, and Safety Guidelines (known as the "EHS Guidelines") are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). The EHS Guidelines are technical reference documents with general and industry-specific examples of GIIP and are referred to in the World Bank's Environmental and Social Framework and in IFC's Performance Standards. The World Bank Group requires borrowers/clients to apply the relevant levels or measures of the EHS Guidelines. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects will be required to achieve whichever is more stringent.

4.0 PROJECT DESCRIPTION

This chapter introduces the applicant, provides an overview of the Project, its location, and provides a detailed description of the various components.

4.1 Details of the Applicant

The application for an ECC has been lodged by Osino Gold Exploration and Mining (Pty) Ltd, contact details are provided in Table 4-1.

Table 4-1: Applicant details

Details	
Company	Osino Gold Exploration and Mining (Pty) Ltd
Relevant representatives	Werner Schuckmann
Tel:	+264 61 246 533
Postal address	P.O Box 3489 Windhoek Namibia
Email	wschuckmann@osinoresources.com
Website(s)	www.osinoresources.com

4.2 Project Overview

4.2.1 Rationale for the Proposed Project

The current Definitive Feasibility Study (DFS) mine infrastructure and plant designs indicate a daily water demand of 3 300 m^3/day or 1,1 Million m^3/a which is calculated based on the fact that, it will initially cater for 5 Mtpa through put to sustain mining operations and related activities. Various water supply options are being investigated to secure water supply to the Twin Hills Gold Mine, despite the success of the water supply investigations undertaken to date on the Karibib Marble Aquifer. The aim is to ensure water security and minimise potential impact of local sources owning to the fact that the Twin Hills Gold Mine project is located in the water scarce Central Areas of Namibia (CAN).

As such one of the options, Osino investigated and confirmed, is feasibility of abstracting groundwater from the Kranzberg Aquifer. Based on the works completed to date, it is now known that the Kranzberg Aquifer has two sub-aquifers, namely the Kranzberg- and Aroab sub-aquifers. A volume of approximately 700 000 m^3/annum is recharged to the 'Abstraction Area' from local runoff alone. Sustainable abstraction from the Kranzberg Aquifer of 460 800 m^3/annum was recommended from five (5) newly drilled production boreholes. The volume was validated through a recharge study and groundwater numerical model developed for the aquifer.

This requires construction of a pipeline that will transfer groundwater from boreholes in the aquifer via Karibib to the terminal reservoir on the Twin Hills Gold Mine site.

4.2.2 Project Components

It is proposed to construct a pipeline that will transfer groundwater from Kranzberg Aquifer boreholes via Karibib to the terminal reservoir on the Twin Hills Gold Mine site. The pipelines would be laid underground with ND200 oPVC Class 12 and 16 pipes. The approximate lengths under consideration for the proposed pipelines are outlined in Table 4-2 below.

Table 4-2: Summary of Proposed Pipeline Routes

Pipeline Route	Approximate Length
Kranzberg to Karibib	A – 26.7 km
	B – 41.7 km
Karibib to Twin Hills	C – 21.2 km
	D – 21.5 km

4.3 Pipeline Route Alternatives

Two alternative routes are proposed for each of the proposed pipelines as discussed below. Please refer to Figure 4-1 for the proposed pipeline routes and alternatives.

4.3.1 Pipeline from Kranzberg to Karibib

Proposed Route A (light blue in Figure 4-1) has a length of 26.7 km and follows along the B2 road to Karibib. The alignment of the proposed route (whether it will be north or south of the B2 road) will be confirmed during detailed design of the pipeline route.

Proposed Route B (dark blue in Figure 4-1) has a length of 41.7 km and leaves Kranzberg in a north-easterly direction where it passes the airfield on the south side. It crosses the C33 road and follows the proposed re-routing of the D1941 road and then turn off into the mine and terminates at the highest point of the area demarcated for the mine's plant.

4.3.2 Pipeline from Karibib to Twin Hills

Proposed Route C (green route in Figure 4-1) has a length of 21.2 km and follows the existing NamWater pipeline from their reservoir in Karibib towards the Farm Spesbona. As of point A it diverts from the Spes Bona pipeline to the east and passes the airfield on the south side. It crosses the C33 road and follows the proposed re-routing of the D1941 road and then turn off into the mine and terminates at the highest point of the area demarcated for the mine's plant.

Proposed Route D (purple route in Figure 4-1) has a length of 21.5 km and leaves Karibib due east and turns to the north, crossing the B2 road to follow the C33 road and the proposed re-routing of the D1941 road on the east side.

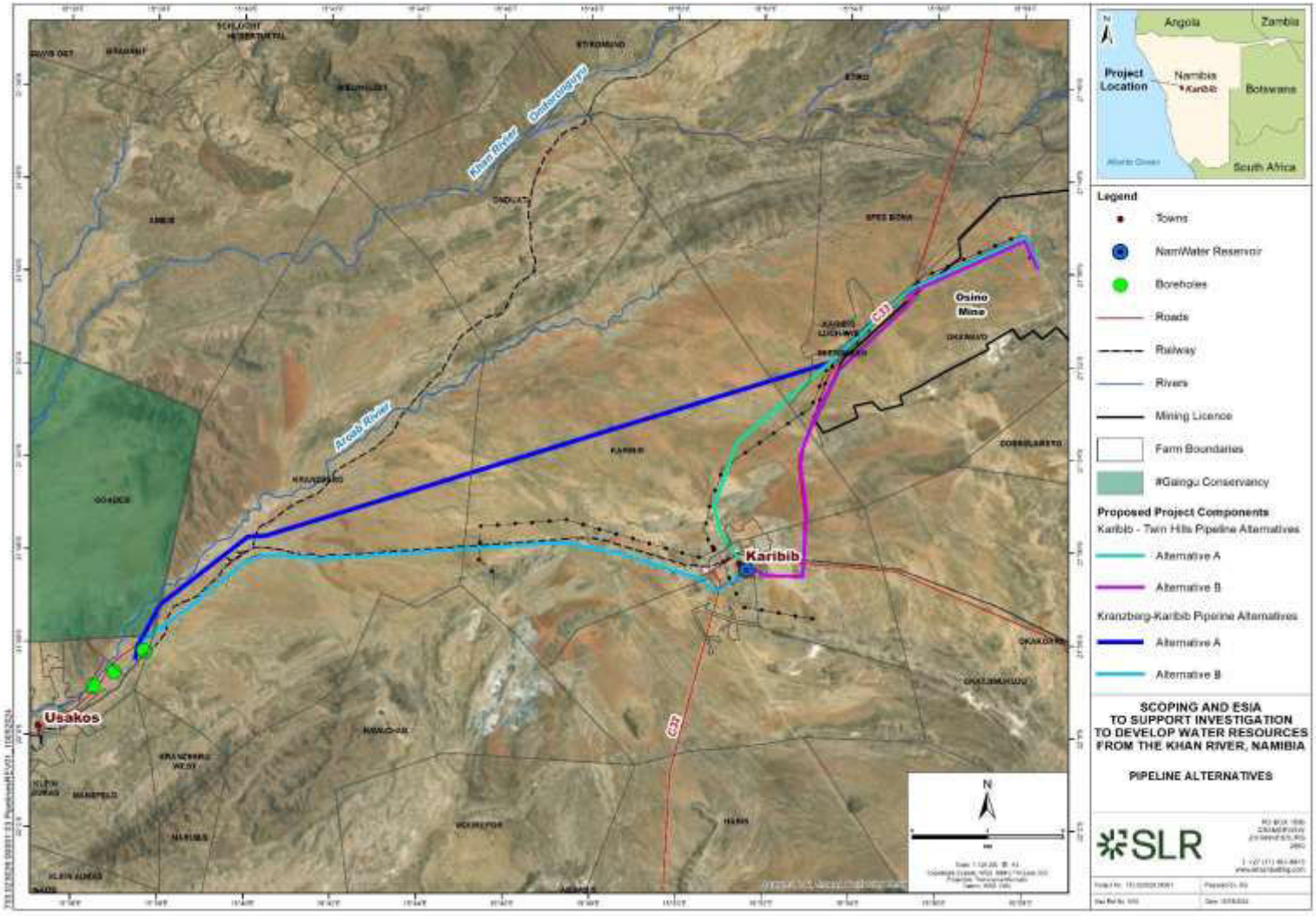
Angola
Zambia
Project Location
Namibia
Karibib
Botswana
South Africa
Legend
Towns
NamWater Reservoir
Boreholes
Roads
Railway
Rivers
Mining Licence
Farm Boundaries
#Gaingu Conservancy
Proposed Project Components
Karibib - Twin Hills Pipeline Alternatives
Alternative A
Alternative B
Kranzberg-Karibib Piperine Alternatives
Alternative A
Alternative B
SCOPING AND ESIA
TO SUPPORT INVESTIGATION
TO DEVELOP WATER RESOURCES
FROM THE KHAN RIVER, NAMIBIA
PIPELINE ALTERNATIVES
SLR
Osino Mine
Karibib
Usakos
Khan River
Onderungupu
Aroab River
C33
C32

Figure 4-1: Locality of Project Site

4.4 Project Phases

The Project can be divided into three main phases, construction, operation, and decommissioning.

4.4.1 Construction Phase

The duration of the construction and commissioning phase of the Project is estimated to be approximately 6 to 12 months. Construction activities will include:

- Site preparation, including Sub-contractor mobilisation, erection of fencing or suitable barriers, where required to protect sensitive habitat and archaeological sites, establishment of the construction camp and lay down areas;
- Site clearance;
- Laying of pipeline (trenching); and
- Commissioning.

4.4.2 Operational Phase

Once construction is completed the operational responsibility (including maintenance) will be transferred to NamWater. Regular maintenance will be required to ensure the pipeline is kept in optimal working order.

4.4.3 Decommissioning Phase

It is not expected that the pipeline would be decommissioned. Decommissioning involves removing the pipeline and associated infrastructure and covering the concrete footings with soil to a depth sufficient for the re-growth of natural vegetation.

Any other supporting infrastructure no longer in use will be removed from the site and either disposed of at a registered disposal facility or recycled if possible. Since it is not currently known which disposal facilities will be available at the time of disposal (i.e. in +20 years' time), it is not possible to identify specific landfill facilities at this stage. When the time for decommissioning comes, the nearest facilities registered to receive waste and recycled material from the pipelines will be identified and utilised.

5.0 DESCRIPTION OF THE CURRENT ENVIRONMENT

5.1 Introduction

This chapter provides a description of the attributes of the physical, biological, socio-economic, and cultural receiving environment associated with the Project. The proposed Project is situated in the Erongo Region of Namibia. An understanding of the environmental and social context and sensitivity within which the proposed Project activities would be located is important to understanding the potential impacts.

5.2 Land Uses

The surrounding area is a commercial agricultural region, with the land use dominated by cattle, game and small stock farming. No large-scale irrigation farming is present in the surrounding area. The nearest urban areas are Karibib, Usakos and Omaruru.

5.3 Climate Baseline

Namibia is one of the largest and driest countries in sub-Saharan Africa. In general, the country is hot and dry with sparse and erratic rainfall. Most of the country is defined as very arid, arid, or semi-arid, with two deserts, namely the Kalahari and Namib, covering large portions of the west and east of the country, respectively. Aridity decreases towards the central plateau regions, and the great escarpment between the Namib desert and central plateau.

Seasons in Namibia are not equally divided across the year. Spring and autumn are short transitional periods between the summer months (October– March) and the mid-year winter months. Although summer is considered the rainy season, for much of the country rainfall is low, variable and unpredictable (Mendelsohn, et al. 2022).

These weather patterns experienced across Namibia are strongly influenced by a dominant high-pressure system over the ocean, and the cold Benguela ocean current (Mendelsohn, et al. 2022). This current, which is driven by a high-pressure system, generally suppresses rainfall. During the summer months, the Inter-Tropical Convergence Zone (ITCZ) draws moisture from the equator to the northern and eastern regions of the country, which leads to rainfall between October and April (rainy season).

Mean annual rainfall is around 278 mm, ranging from 650 mm in the northeast to less than 50 mm in the southwest and along the coast (Figure 5-1). Average monthly rainfall is highest in January (~62 mm), February (~66 mm), and March (~55 mm). Namibia is an arid, water deficient country, with very high evaporation rates (at least five times greater than average rainfall over most of the country).

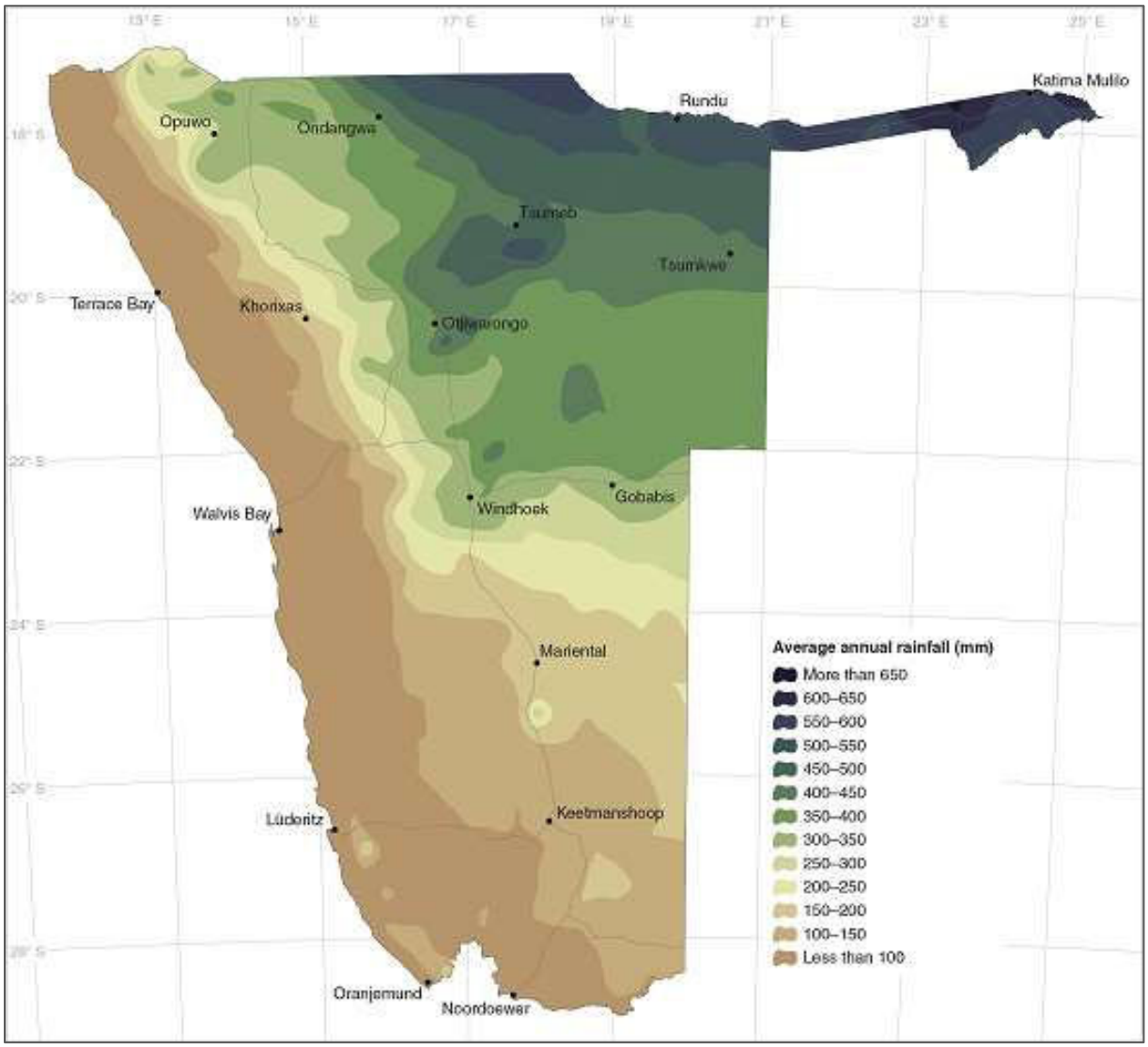

Figure 5-1: Average annual rainfall
Source: (Mendelsohn, et al. 2022)

Namibia's mean annual temperatures range from 14.3°C to 24.2°C (Figure 5-2). In general, temperatures are higher in the continental regions, reaching above 22°C. There is a distinct seasonal temperature regime in the continental regions with highest temperatures occurring just before the rainy season. The lowest temperatures occur during the dry season, from June to August. Along the coast, mean annual temperatures are moderated by Benguela current, reaching below 16°C in the south.

Figure 5-3 presents the monthly minimum, mean, and maximum temperatures, as well as rainfall, of the Erongo region (in which the project site is situated) from 1901 to 2020. Mean monthly temperatures range between 24.68°C in January to 14.76°C in July. Rainfall ranges between 66.83 mm in January to 0.36 mm in July.

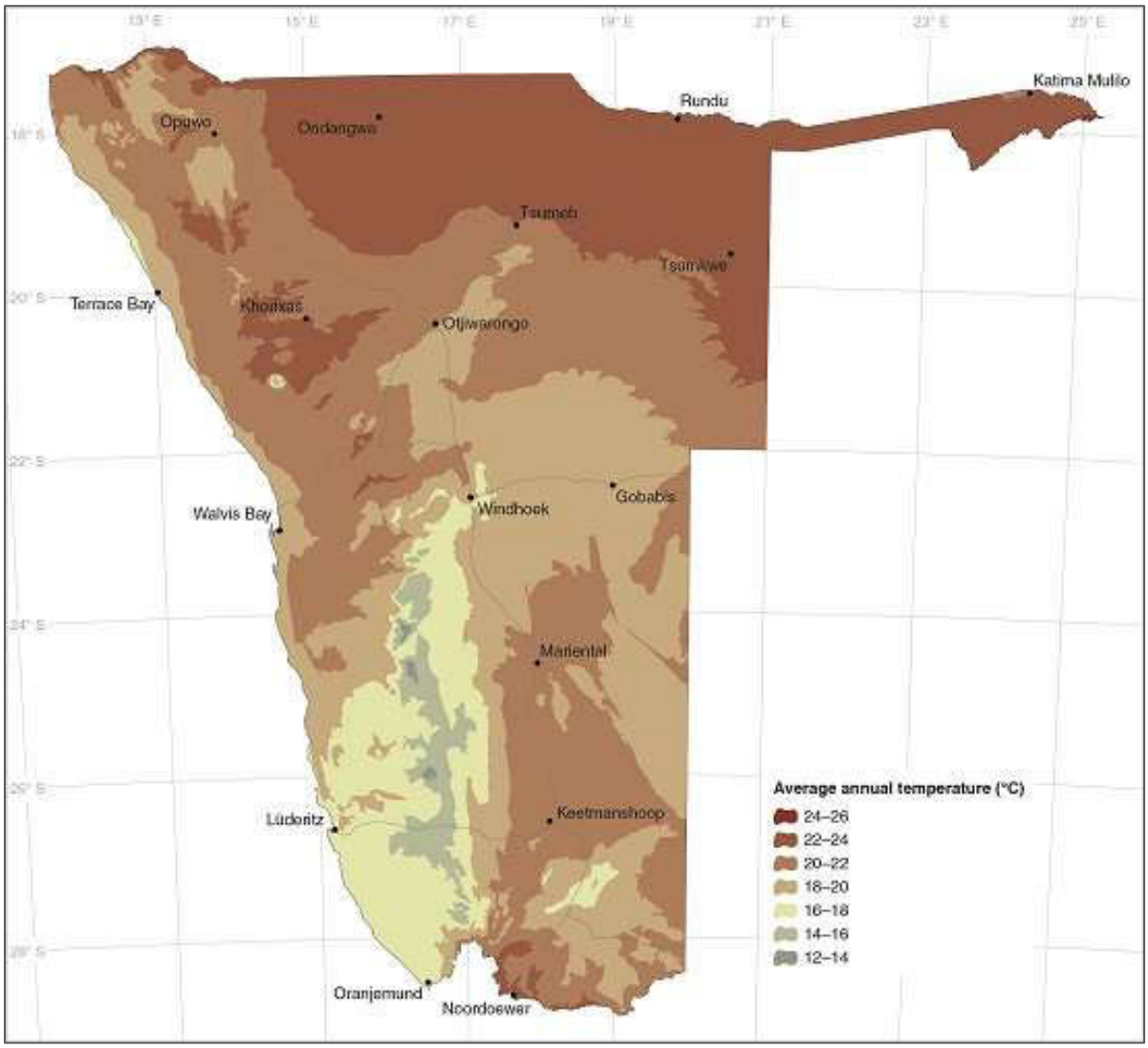

Figure 5-2: Average annual temperature
Source: (Mendelsohn, et al. 2022)

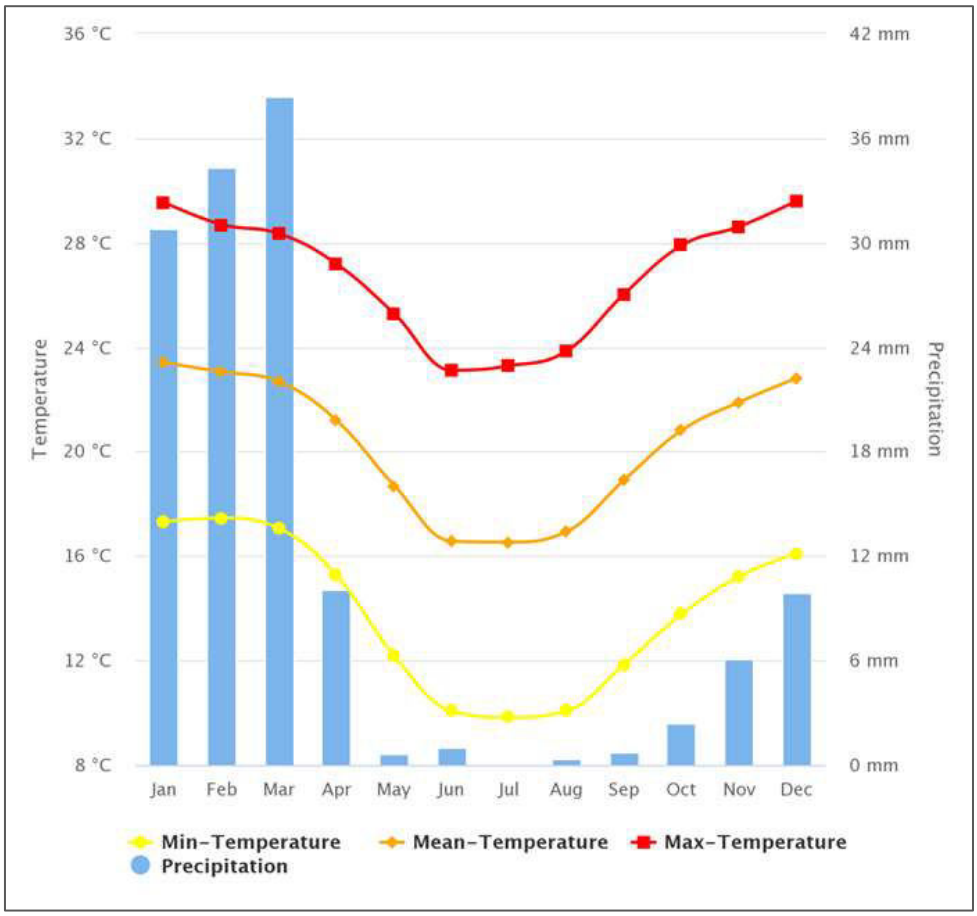

Figure 5-3: Monthly minimum, mean and maximum temperatures and rainfall from 1991 to 2022

The temperatures in Usakos are typically to that of a semi-arid region. Rainy seasons occurs during the summer's months, while very little to no rainfall is experience during the winter months. Summer months are quite warm, with average temperatures during daytime ranging from mid-20's –to mid-30's °C, while the winter months, temperatures during daytime are ranging from mid-10's to low 20's°C. At nighttime, temperatures can drop significantly, especially during the dry winters, leading to cooler evenings.

Rainfall can have a direct or indirect impact on the recharge of an aquifer. Direct recharges occur when rainfall that hits the ground is infiltrating immediately into the unsaturated formation, while the indirect recharge occurs when rainwater is flowing over the surface as runoff. Rainfall data obtained from the Usakos Weather Station (*8261494*) was used to determine the rainfall pattern. The 50-year records were evaluated where it was observed that high rainfall is generally received during the months of January to March, and decreases slightly in April, with minimal to no rainfall received in May to October (see Figure 5-4 for the rain pattern).

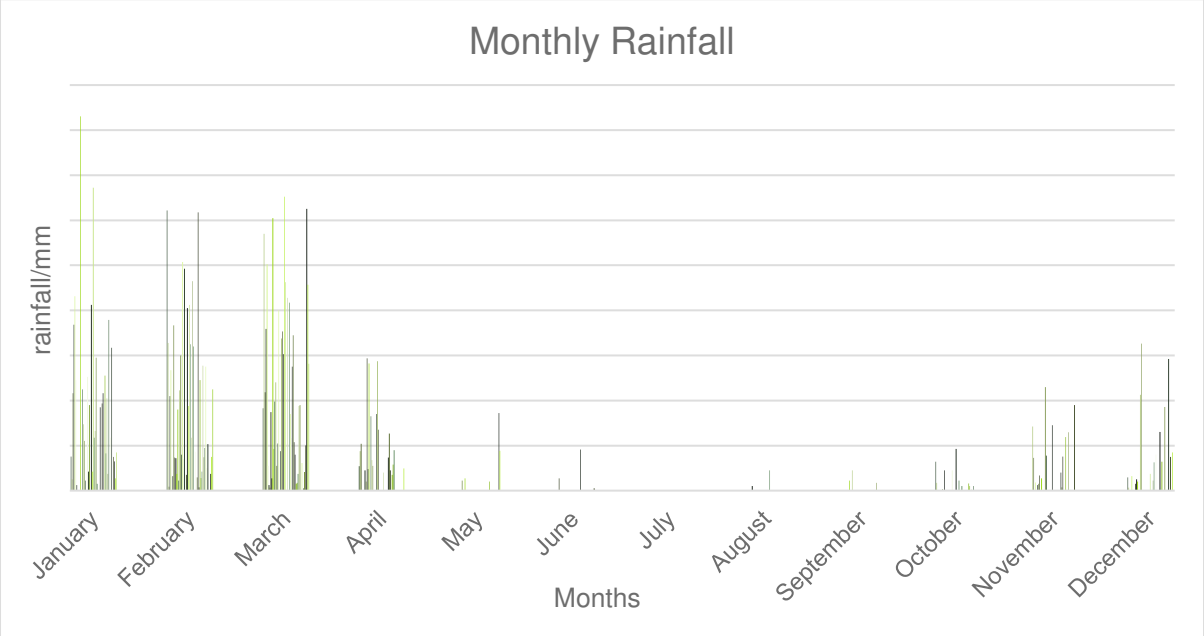

Figure 5-4: Monthly rainfall recorded at the Usakos Weather Station from 1953 - 2003.

Over the 50-year period average annual rainfall was observed to be on the decline (see dash line in Figure 5-5). An average annual rainfall was calculated at 133 mm/a. Above average rainfall was received during 1953-1954, 1956-1957, 1963, 1966-1967, 1969, 1971-1972, 1974-1976, 1978-1980, 1985, 1989, 1997, 2000, and 2002 (see orange line in Figure 5-5).

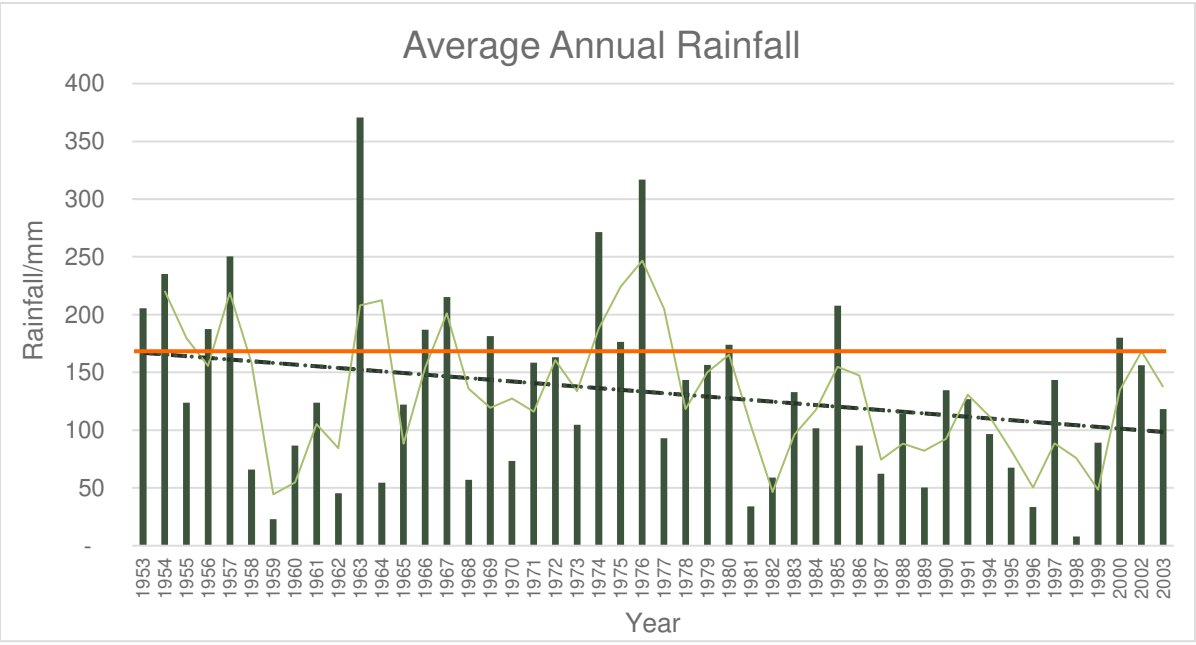

Figure 5-5: Average Annual Rainfall recorded at Usakos weather station.

5.4 Topography and Landscape

The general relief of the surrounding area is moderate with elevation ranging from approximately 900 m in the southwest to 1900 m in the northeast, with significant hills and mountains generally associated with granitic outcrops above subdued plains (Underwood *et al.* 2019*).*

5.5 Local Geology

Between Usakos and Karibib in Namibia, the local geology consists of a diverse range of rock formations that provide valuable insights into the geological history of the region. The area primarily falls within the larger Damara Belt, which is known for its complex tectonic and metamorphic history. Figure 5-6 shows some key geological features and formations found between Usakos and Karibib:

- Nosib Quartzite Formation: This formation consists of hard quartzite rocks and forms the Damara Age basement of the region. It is associated with the Erongo Mountain range, which stretches along the northern boundary of the Kranzberg aquifer.
- Kuiseb Formation: The Kuiseb Formation is characterized by mica schist, quartzite, and phyllite rocks. It underlies the southern part of the Kranzberg aquifer, creating a basin-like structure in the region.
- Basement Complex: The basement complex underlying the region consists of various metamorphic and igneous rocks. These include gneiss, granite, schist, and amphibolite, which represent the oldest rocks in the area and are part of the Precambrian terranes.
- Alluvial Deposits: Along the valleys and channels, particularly within the basin, there are alluvial deposits consisting of unconsolidated to semi-consolidated materials. These deposits are the result of weathering and erosion processes in the surrounding mountain ranges, carried and deposited by gravity, wind, or flowing water.

The local geology between Usakos and Karibib showcases a mix of sedimentary, metamorphic, and igneous rocks, highlighting the geological complexity and diverse geological history of the region. This geological setting contributes to the unique landscape and mineral resources found in this part of Namibia (SLR, 2024b).

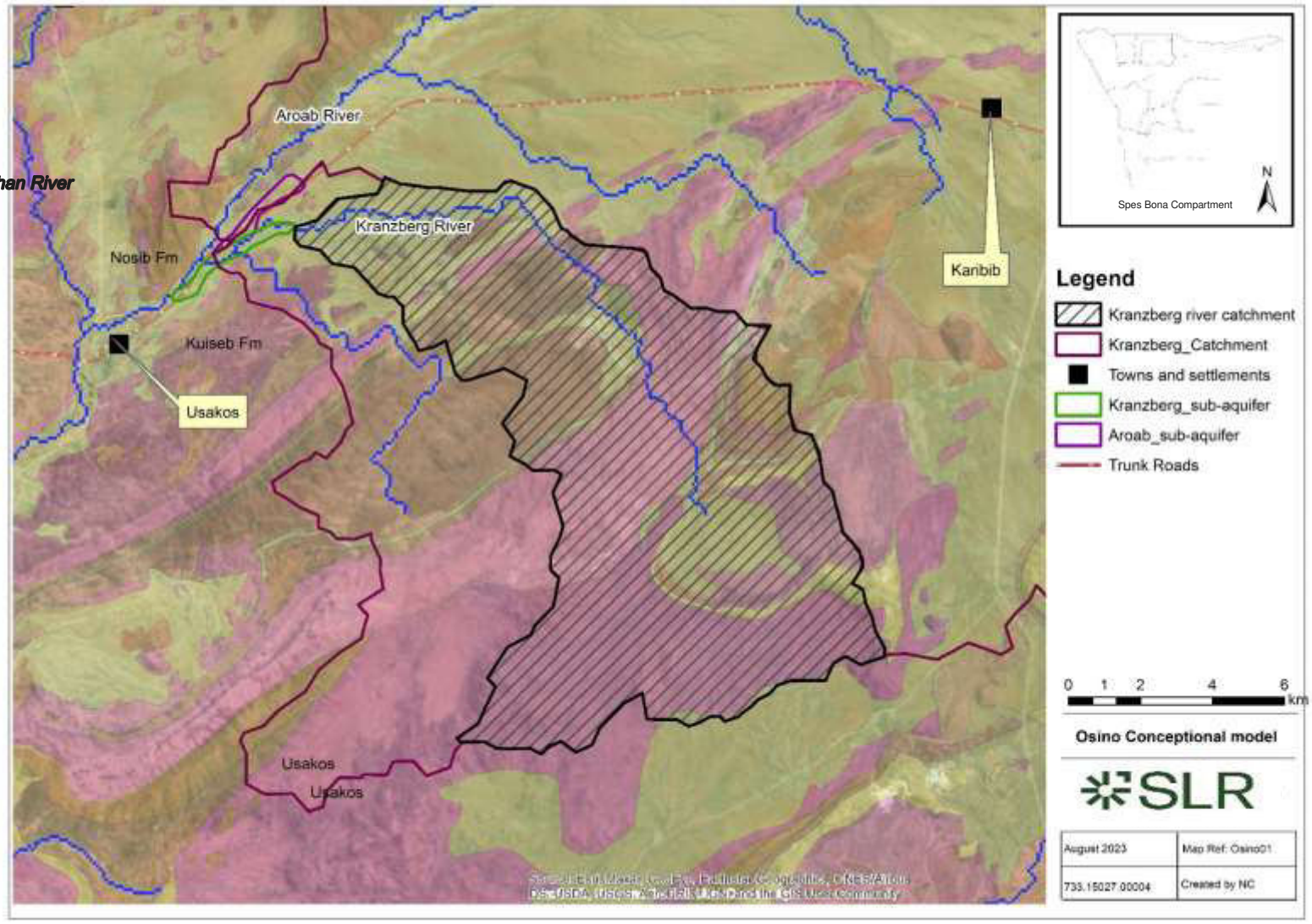

Figure 5-6: Geological map of the Kranzberg drainage area within the Swakop catchment

5.6 Surface Water Baseline

While perennial rivers are found only on the country's borders, ephemeral rivers are prominent and flow during the rainy season after high rainfall events. As such, the Project area is located within the ephemeral Swakop-Khan River Catchment and its many tributaries that covers an area of 30 100 km², which extend from Okahandja, and in the south to Khomas Highlands outside Windhoek and mouth at into the Atlantic Ocean at Swakopmund.

The Kranzberg Aquifer is within the Aroab and Kranzberg rivers, these are smaller tributaries within a sub catchment of the Khan River. As all rivers are ephemeral rivers, they are dry for most of the year and sometimes even for the whole duration of a year and flow during flood events or after heavy rains. River runoff is mostly generated in the upper part of the catchment and only if the volume of runoff generated is large enough (flash floods) rivers will flow without completely evaporating or infiltrating into the alluvial sediments. These so-called flash floods are relatively short and highly variable in size, duration, and occurrence (SLR, 2024b).

5.7 Groundwater Baseline

The Twin Hills Gold mine project is situated within the Southern Central Zone of the Neo-Proterozoic aged Damara Supergroup, comprising of continental margin carbonates and silts which grade into turbidite sequences representing continental shelf and basin deposits. The Swakop Group of the Damara Supergroup is most dominant underlaying geology.

Based on the geology, three aquifers are classified in the area according to the Hydrogeological Map of Namibia by aquifer type and perceived groundwater potential as shown in Figure 5-7(SLR 2023, Lohe et al., 2021).

- First, is a porous aquifer of moderate groundwater potential with primary porosity, confined to the Khan, Aroab and Kranzberg rivers;
- Second is a fractured aquifer with secondary porosity constituted by Kuiseb formation greywacke and shale generally low to locally moderate in groundwater potential; and
- Third is a fractured aquifer confined to the southwestern part of the Project in the marbles.

Groundwater is the main source of water supply to communities residing in towns, communal and commercial farmer as well as some mining operations in the area. The consumption is supplied from local boreholes.

The Kranzberg Water Supply Scheme is located in the Kranzberg Paleochannel Aquifer (KPA) (Figure 5-7) , which consist of paleochannel, due to the fluviatile sediments, overlying the hard, basement rocks. From literature and the drilling of production boreholes, the intersected strata revealed two water bearing systems as follows (SLR, 2024b):

5.7.1 Alluvial/Paleochannel aquifer

The Kranzberg aquifer is an alluvial aquifer system, which according to the drilling results consist of unconsolidated to semi-consolidated sediments and alluvium, that is mainly quartzites, calcretes, sand, and gravel. These sediments originate from the surrounding mountainous region and provide significant porosity, storage capacity, and high hydraulic conductivity, facilitating the movement of groundwater. The present Kranzberg aquifer is formed by a paleo river channel that runs roughly

parallel to the current Aroab, and Kranzberg River courses. The aquifer is capped with a calcrete plain extending from Usakos in a northwest direction to Karibib. The Aroab and Kranzberg Rivers are incised into this plain and has variable thickness of alluvium.

The paleochannel is bounded and underlain by hard basement rocks. The northern boundary is formed by the Nosib quartzite formation, which constitutes the Erongo Mountain range. Towards the south, the aquifer is bordered by the Kuiseb mica schist formation. From Usakos the alluvial channel is thickening towards the northeast, giving rise to the wider calcrete plains. Geophysical cross sections undertaken at the site show how the main KPA is dived into two (2) sub aquifers, namely the Aroab sub aquifer which runs parallel to the northern boundary of the aquifer, and Kranzberg sub aquifer following to the existing Kranzberg River course.

5.7.2 Basement aquifer

The Kranzberg aquifer is underlain by metamorphic rocks of the Damara Supergroup. The basement rocks intersected during the drilling consist of quartzite, marble, and mica schists. The basement can be classified as a fractured aquifer or aquitard system since the primary porosity of the rocks provide limited storage capacity and groundwater movements while the secondary features such as fractures and faults allow the groundwater flow. Limited information exists on the hydraulic behaviour of the basement rocks in the KPA area. It is known that the Damara Supergroup rocks act as low permeable aquifer with low and limited potential for groundwater development and can therefore be defined as aquitard (SLR, 2024).

5.8 Aquifer delineation

Two sub-aquifer was defined and delineated using the geophysical data produced by Earthmaps (2023). The Kranzberg sub-aquifer is a total of 4 km in length and covers an area of 1.29 km^2 (1 289 427 m^2). The Kranzberg sub-aquifer is also following the surface river and is believed to be recharged from surface runoff in the river. The Aroab sub-aquifer is a total of 3 km in length and covers an area of 1.0 km^2 (1 031 190 m^2). Generally, the groundwater flow follows the topography, thus the groundwater flow in Kranzberg is flowing from east to west. The sub-aquifers are potentially larger, extending to the north and northeast respectively however, the current boundaries are limited by the area covered during the geological survey (SLR, 2024b).

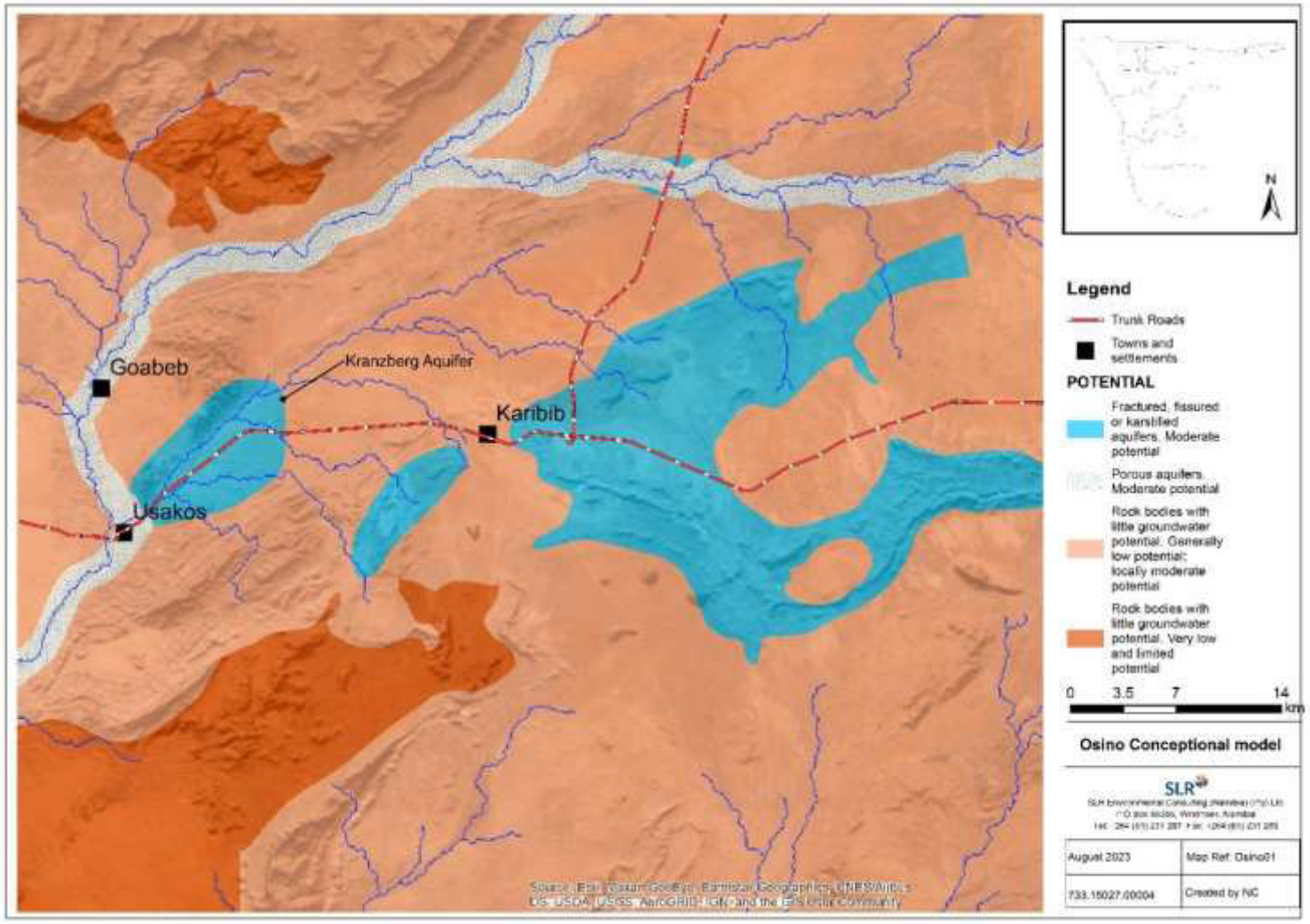

Figure 5-7: Map displaying the outline of the Kranzberg Paleochannel Aquifer, which is situated between Usakos and Karibib (SLR, 2024)

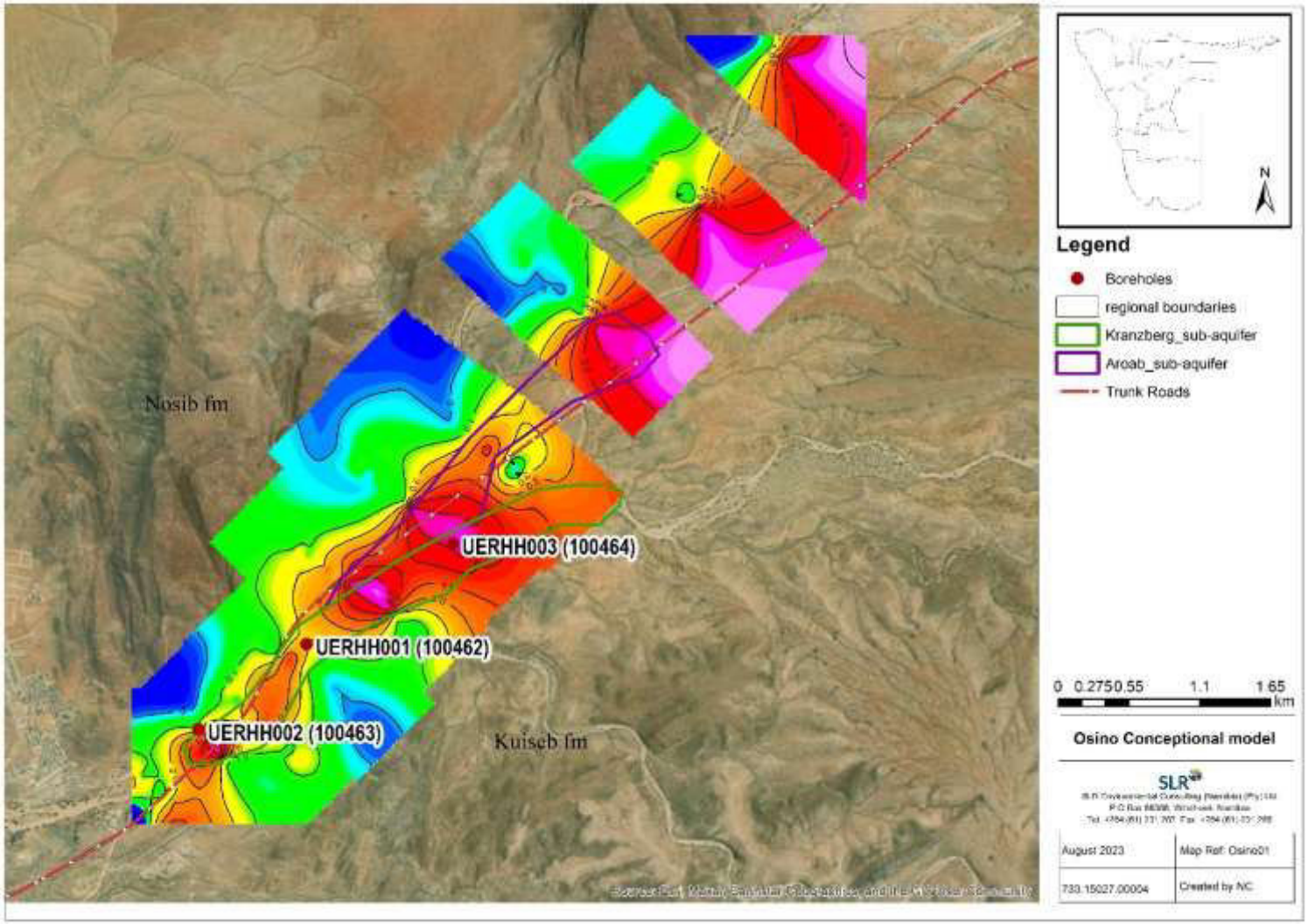

Figure 5-8: Delineation of the Kranzberg sub-aquifer and Aroab sub-aquifer SLR, 2024)

5.9 Freshwater Ecoregion

The Project area is situated in the Namib freshwater ecoregion. This ecoregion is characterised by ephemeral rivers except for one perennial river namely the Cunene River. There are twelve major ephemeral rivers in the Namib coastal ecoregion and their catchments vary in size from less than 2 000 km^2 (the Khumib River) to over 30 000 km^2 (the Swakop River) (Loutit 1991). The ecoregion is primarily within Namibia and extends into southwestern Angola.

The ephemeral systems include rain-fed endorheic pools or pans, rivers that flow for short periods, and pools that remain in the riverbeds after the flow has ceased. The ephemeral rivers are dependent on water from upstream to replenish their underground aquifers. Rainfall is highly seasonal and river discharges may range within an order of magnitude from the dry to the wet season (Day 1997).

Wetlands do form an important part of these ephemeral systems and several ephemeral rivers have permanent or semi-permanent wetlands at their mouths.

5.10 Terrestrial Biodiversity Baseline

The general Karibib/ Usakos area commonly referred to as the Semi-desert Savannah and Transition Zone [Escarpment area] (Giess 1971, Van der Merwe 1983) or the areas referred to by Mendelsohn et al. (2002) as the Western Highlands. This semi-desert and savannah transition zone as referred to by Giess (1971) is typified by shrubs (“fodder bushes”) such as *Blepharis pruinosa, Leucosphaera bainesii* and *Monechma genistifolia*. Larger woody species such as *Acacia erioloba* are confined to the drainage lines. The Karibib area is characterised by *Acacia senegal* shrubs while *Cyphostemma currorii* and *C. bainesii* also occur in this region. The trees common in the area are *Commiphora glaucescens, C. virgata* and *C. dinteri* as well as *Boscia albitrunca* and *B. foetida*. The grass cover is sparse and consists of the climax grasses *Stipagrostis obtusa* and *S. uniplumis* (Giess 1971).

The Namib Desert biome is well protected with parks in this biome making up 69% of the network compared to only 7% of the Savannah biome being formally protected, and the Mountain Savannah area being wholly under protected (Barnard 1998). Escarpments, mountains and inselbergs are generally considered as sites of special ecological importance with granite domes (Karibib and Omaruru districts) high in biotic richness and endemism (Curtis and Barnard 1998).

The Karibib area in general is regarded as “moderate” in overall (all terrestrial species) diversity while the overall terrestrial endemism in the area on the other hand is “high” (Mendelsohn *et al.* 2002). The overall diversity and abundance of large herbivorous mammals (big game) is viewed as “moderate” with 3-4 species expected – e.g., gemsbok, kudu, mountain zebra and springbok – while overall diversity and density of large carnivorous mammals (large predators) is viewed as “moderate” with four (4) species expected – e.g., leopard, cheetah, spotted and brown hyena (Mendelsohn *et al.* 2002).

The general Karibib area is viewed as an area of importance for local endemic plant species, especially the Erongo Mountains with between 26-35 endemic species (Mendelsohn *et al.* 2002). The overall plant diversity (all species) in the general Karibib area is estimated at between 150-299 species and the Erongo Mountain area between 400-499 species (Mendelsohn *et al.* 2002). These estimates are limited to "higher" plants as information regarding "lower" plants is sparse. The greatest variants affecting the diversity of plants are habitat and climate with the highest plant diversity generally associated with high rainfall areas. Pockets of high diversity are found throughout Namibia in "unique" habitat – often transition zones – e.g., mountains, inselbergs, etc. Plant endemism, other than the Erongo Mountains, is viewed as "medium to high" – with between 6-15 endemics expected from the general area (Mendelsohn *et al.* 2002). Furthermore, Mendelsohn *et al.* (2002) views the overall plant production as medium to low in the general Karibib area and high in the Erongo Mountains, the availability of hardwoods as medium and the grazing and browse as average in the general area. Bush thickening (encroachment) is viewed as problematic between Karibib and Omaruru with *Acacia reficiens* (red-bark Acacia) the dominant problem species (Bester 1996, Cunningham 1998, Mendelsohn *et al.* 2002).

The carrying capacity for the general area is 10-20 kg/ha (Mendelsohn *et al.* 2002) or 12-15 large animal units per hectare (LAU/ha) (van der Merwe 1983) and the risk of farming is viewed as relatively high. Sheep farming is the dominant farming activity in the Karibib area with between 70-80% of stock farmed with being sheep, and 20-30% goats and cattle, respectively (van der Merwe 1983). The stock density is estimated at < 3 sheep/km² (1.5% of total sheep in Namibia) and < 1 cattle/km² (1.3% of total cattle in Namibia) (van der Merwe 1983). There are numerous existing tourism ventures in the area with the tourism potential viewed as relatively high (Mendelsohn *et al.* 2002).

The area does not fall within a communal conservancy with the closest being the ǂGaingu Conservancy located in the Spitzkoppe area to the west of Karibib, neither within a Freehold (i.e., commercial) conservancy with Okawi being the closest, east of Karibib (MEFT/NACSO 2021, Mendelsohn et al. 2002, NACSO 2010, See: www.nacso.org.na).

It is estimated that at least 75 species of reptile, seven (7) amphibian, 88 mammal, 217 birds, 74-101 larger trees and shrubs and up to 80 grass species occur in the general /immediate area of which a high proportion are endemics (e.g., reptiles – 45.3%).

5.10.1 Vertebrate Fauna

5.10.1.1 Reptile Diversity

Reptile species observed and/or confirmed from the Twin Hills Mine area include 12 species (1 terrapin, 4 skinks, 3 Old World lizards, 2 agamas and 2 geckos) (Cunningham 2021); the Navachab Gold Mine area (just to the west of Karibib) included 27 species (1 tortoise, 1 terrapin, 5 snakes, 9 lizards, 1 monitor lizard, 2 agamas and 8 geckos) (Cunningham 2011) and the Helikon/ Rubicon Lithium Mine areas (approximately 30 km south of Karibib) included 5 species (2 skinks, 1 Old World lizard and 2 agamas) (Cunningham 2013) and six

(6) species (1 python, 1 skink, 2 Old World lizards, 1 agama and 1 gecko), respectively (Cunningham (2017).

During the fieldwork a total of at least 27 species are confirmed from the general area if one includes species identified by Cunningham (2011, 2013, 2017, 2021).

The most important species expected to occur in the general area are viewed as the tortoises *Stigmochelys pardalis* and *Psammobates oculiferus*; pythons – *P. anchietae* and *P. natalensis*; Namibian wolf snake (*Lycophidion* namibianum) – *Varanus albigularis* and some of the endemic and little-known gecko species – e.g., *Pachydactylus* species. Tortoises, snakes and monitor lizards are routinely killed for food or as perceived threats. Other important species are those viewed as "rare" – i.e., *Rhinotyphlops lalandei*, *Mehelya vernayi* and *Afroedura africana* – although very little is known about these species.

The Project area has been heavily impacted due to various anthropomorphic activities (e.g., Karibib urban area, transmission lines, roads/ tracks, mining/ prospecting activities, etc.) and none of the unique reptiles are expected to be exclusively associated with this area.

5.10.1.2 Amphibian Diversity

Amphibian species observed and/or confirmed from the Osino area is *Phrynomantis annectens* (marbled rubber frog) (Cunningham 2021); Navachab Gold Mine area (just to the west of Karibib) included one (1) toad and one (1) rubber frog (Cunningham 2011) while no amphibians were confirmed from the Helikon/ Rubicon Lithium Mine area (approximately 30 km south of Karibib) (Cunningham 2013, 2017).

During the fieldwork no amphibians were identified in the general area and no standing surface water was observed in the various drainage lines throughout the area either – i.e., likely amphibian breeding habitat.

Important species include the two (2) endemics – *Poyntonophrynus hoeschi* and *Phrynomantis annectens* and *Pyxicephalus adspersus* which are classified as "near threatened" in southern Africa (Du Preez and Carruthers 2009). The latter species numbers are decreasing throughout its range in Namibia mainly due to being targeted as food (Griffin pers. com). *Phrynomantis annectens* tadpoles were observed in the neighbouring Osino area confirming their presence in the immediate area (Cunningham 2021), they occur widespread throughout Namibia and are not exclusively associated with the Project area.

The Project area has been heavily impacted due to various anthropomorphic activities (e.g., Karibib urban area, transmission lines, roads/ tracks, mining/ prospecting activities, etc.) and none of the unique amphibians are expected to be exclusively associated with this area.

5.10.1.3 Mammal Diversity

Cunningham (2021) confirmed 18 and 13 species of mammals at the Osino Project area during summer and winter, respectively while another six (6) species were confirmed by the

farm manager (Eddie Nederlof *pers. com.*) – i.e., 26 species confirmed for the area (Cunningham 2021). A total of at least 34 species are confirmed from the general area if one includes species identified by Cunningham (2011, 2013, 2017).

During the fieldwork only seven (7) species of mammals were confirmed (i.e., captured, observed and or other evidence – e.g., tracks, scats, etc.) to occur in the Khan River Dam area . A shepherd interviewed on site indicated another five (5) species from the area. A total of at least 31 species are confirmed from the general area if one includes species identified by Cunningham (2011, 2013, 2017, 2021).

5.10.1.4 Avian Diversity

Bird diversity and endemism is viewed as “high” in the general area with 171-200 species, of which eight (8) species being endemic (Mendelsohn et al. 2000) or 12 endemics according to Jarvis et al. (2022). Simmons (1998a) suggests 7-9 endemic species and a “high” ranking for southern African endemics and “average” ranking for red data birds expected from the general area. Although the general area is not classified as an Important Birding Area (IBA) in Namibia (Simmons 1998a) the closest such sites are located to the west at the coast – i.e., Walvis Bay, Sandwich and Mile 4 Saltworks – while the closest inland IBA’s are Brandberg and Naukluft.

According to the literature at least 217 bird species [mainly terrestrial “breeding residents”] occur and/or could occur in the general area at any time (Hockey et al. 2006, Maclean 1985, Tarboton 2001). Twelve of the 14 Namibian endemics are expected to occur in the general area (85.7% of all Namibian endemic species or 5.6% of all the species expected to occur in the area). Eight species are classified as endangered (violet wood-hoopoe, Ludwig’s bustard, white-backed vulture, black harrier, tawny eagle, booted eagle, martial eagle, black stork), two (2) species as vulnerable (lappet-faced vulture, secretarybird) and five (5) species as near threatened (Rűppel’s parrot, kori bustard, Verreaux’s eagle, peregrine falcon, marabou stork) (Simmons et al. 2015). Fifty-seven species have a southern African conservation rating with eight (8) species classified as endemic (14% of southern African endemics or 3.7% of all the birds expected) and 49 species classified as near endemic (86% of southern African endemics or 22.7% of all the birds expected) (Hockey et al. 2006). The International Union for Conservation of Nature (IUCN) (2022) classifies one (1) species as critically endangered (white-backed vulture), five (5) species as endangered (Ludwig’s bustard, lack harrier, lappet-faced vulture, martial secretarybird), one (1) species as vulnerable (tawny eagle) and one (1) species as near threatened (kori bustard).

The most important bird species from the general area are those classified as endemic to Namibia of which the Damara hornbill and Herero chat are viewed as the most important due to the overall lack of knowledge of these species. Although also viewed as important, Rüppels korhaan is migratory throughout its range while the rockrunner inhabits inaccessible terrain and is widespread throughout mountainous areas in Namibia. Other species of concern are those classified as endangered (violet wood-hoopoe, Ludwig’s bustard, black harrier, tawny eagle, booted eagle, martial eagle, black stork) and near threatened (Rűppel’s parrot, Verreaux’s eagle, peregrine falcon, marabou stork) (Simmons et al. 2015) and those

species classified by the IUCN (2020) as critically endangered (white-backed vulture), endangered (Ludwig's bustard, lack harrier, lappet-faced vulture, martial secretarybird), vulnerable (tawny eagle) and near threatened (kori bustard). Although white-backed vulture, lappet-faced vulture and secretarybird are not known to breed in the area, such nesting sites, should these be established and/or located in future, are viewed as extremely important and should be avoided at all costs.

Cunningham (2021) confirmed 56 species of birds from the Osino Project area including two (2) aquatic species (Egyptian goose, common sandpiper), while three (3) species were confirmed by the farm manager – white-backed vulture, lappet-faced vulture, secretary bird (Eddie Nederlof pers. com.) – i.e., 61 species in total confirmed from the Project area. A total of at least 108 species are confirmed from the general area if one includes species identified by Cunningham (2011, 2013, 2017, 2021). The most important species confirmed from the area by Cunningham (2021) are Monteiro's hornbill (endemic), kori bustard (Near Threatened), white-backed vulture (Endangered), lappet-faced vulture (Vulnerable) and secretarybird (Vulnerable).

5.10.2 Flora

5.10.2.1 Tree and Shrub Diversity

It is estimated that at least 74-101 species of larger trees and shrubs (>1m) (Coats Palgrave 1983 [85spp.], Curtis and Mannheimer 2005 [101spp.], Mannheimer and Curtis 2009 [91spp.], Mannheimer and Curtis 2018 [101spp.], Van Wyk and Van Wyk 1997 [62spp. and 12spp. endemic]) occur in the general area.

Eight species of trees and shrubs (7.9%) expected to occur in the general area are classified as endemic, four (4) species as near endemic (4%), 21 species (20.8%) are protected by the Forest Act No 12. of 2001, five (5) species (5%) are protected under the Nature Conservation Ordinance No. 4 of 1975 while six (6) species (5.9%) are classified as the (Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendix 2 species. The IUCN (2022) classifies *Aloe dichotoma* (quiver tree) as vulnerable while all the other tree/ shrub species are classified as least concern or not yet been assessed by the IUCN Red List. All the trees with some kind of conservation and/or protected status are viewed as important in the general Karibib area. The most important species are viewed as *Aloe dichotoma, Commiphora dinteri, Commiphora saxicola, Commiphora virgata, Cyphostemma bainesii, Cyphostemma currorii* and *Erythrina decora*.

The most important protected species (including endemic/ near endemic, etc.) are viewed as and are discussed in the rest of this section:

- Khan River (Riparian habitat)
  - *Acacia erioloba, Albizia anthelmintica, Euclea pseudebenus, Faidherbia albida, Tamarix usneoides* and *Ziziphus mucronata*
- Khan River (Rocky habitat)
  - *Aloe litoralis, Boscia albitrunca, Commiphora glaucescens, Ficus cordata* and *Sterculia africana*
- Savannah areas (adjacent undulating gravel areas)

- *Acacia erioloba* and *Boscia albitrunca*

5.10.2.2 Grass Diversity

It is estimated that at least 52-72 grasses (Müller 2007 [72spp.], Van Oudshoorn 1999 [52spp.]) – approximate total of 80 species – occur in the general Project area. Of the approximately 80 grasses that are expected in the general area, two (2) species are viewed as endemic (*Eragrostis omahekensis* and *Pennisetum foermeranum*).

Although between 52 and 72 grasses are known and/or expected to occur in the general area, a total of 19 species of grasses were identified throughout the Project area while a total of at least 33 species are confirmed from the general area if one includes species identified by Cunningham (2013, 2017, 2021).

5.10.2.3 Important Areas

Aroab River riparian habitat – Kranzberg area

The Aroab River riparian habitat is important as larger trees are associated with this habitat, especially large and protected *Acacia erioloba*, *Euclea pseudebenus*, *Faidherbia albida* and *Ziziphus mucronata* (See Figure 5-9). Such larger trees serve as habitat to a variety of vertebrate fauna (e.g., bark and crevasse dwelling bats/ reptiles; nesting/ roosting/ perching sites for various large raptors and the endemic Rüppel's parrot, etc.) as well as important ecosystem services such as stabilise the riverbank (e.g., *Ziziphus mucronata*) and limit/ prevent erosion.

Permits would be required from the MEFT to destroy/ remove all the above-mentioned species.

The recovery potential is LOW. Affected vegetation would require >10yrs to recover after initial disturbance.

Figure 5-9: The well vegetated Aroab River, a tributary of the Khan River, in the Kranzberg Station area is visible in the background

Rocky Habitat

Rocky areas generally have high biodiversity and are consequently viewed as important habitat for all vertebrate fauna and flora in the general area. Protected species associated with and confirmed from the hills in the Project area include unique species such as *Aloe litoralis*, *Commiphora glaucescens*, *Ficus cordata*, *Moringa ovalifolia* and *Sterculia africana* (See Figure 5-10 and Figure 5-11).

Permits would be required from the MEFT to destroy/ remove all the above-mentioned species. The recovery potential is LOW. The affected vegetation would require >10yrs to recover after initial disturbance.

Ephemeral Drainage Lines

The various ephemeral drainage lines which are tributaries to the Aroab River in the general Project area (See Figure 5-12) are important as these serve similar functions as the Aroab and Khan River habitats mentioned above.

Permits would be required from the MEFT to destroy/ remove all the protected tree species. The recovery potential is LOW. The affected vegetation would require >10yrs to recover after initial disturbance.

Figure 5-10: Hills in the general area have unique protected tree/ shrub species such as *Aloe litoralis* (Windhoek Aloe – protected F, NC) along the Pipeline A route between Karibib and Twin Hills.

Figure 5-11: Hills in the general area have unique protected tree/ shrub species such as *Moringa ovalifolia* (phantom tree – protected F) along the Pipeline B route between Karibib and Twin Hills.

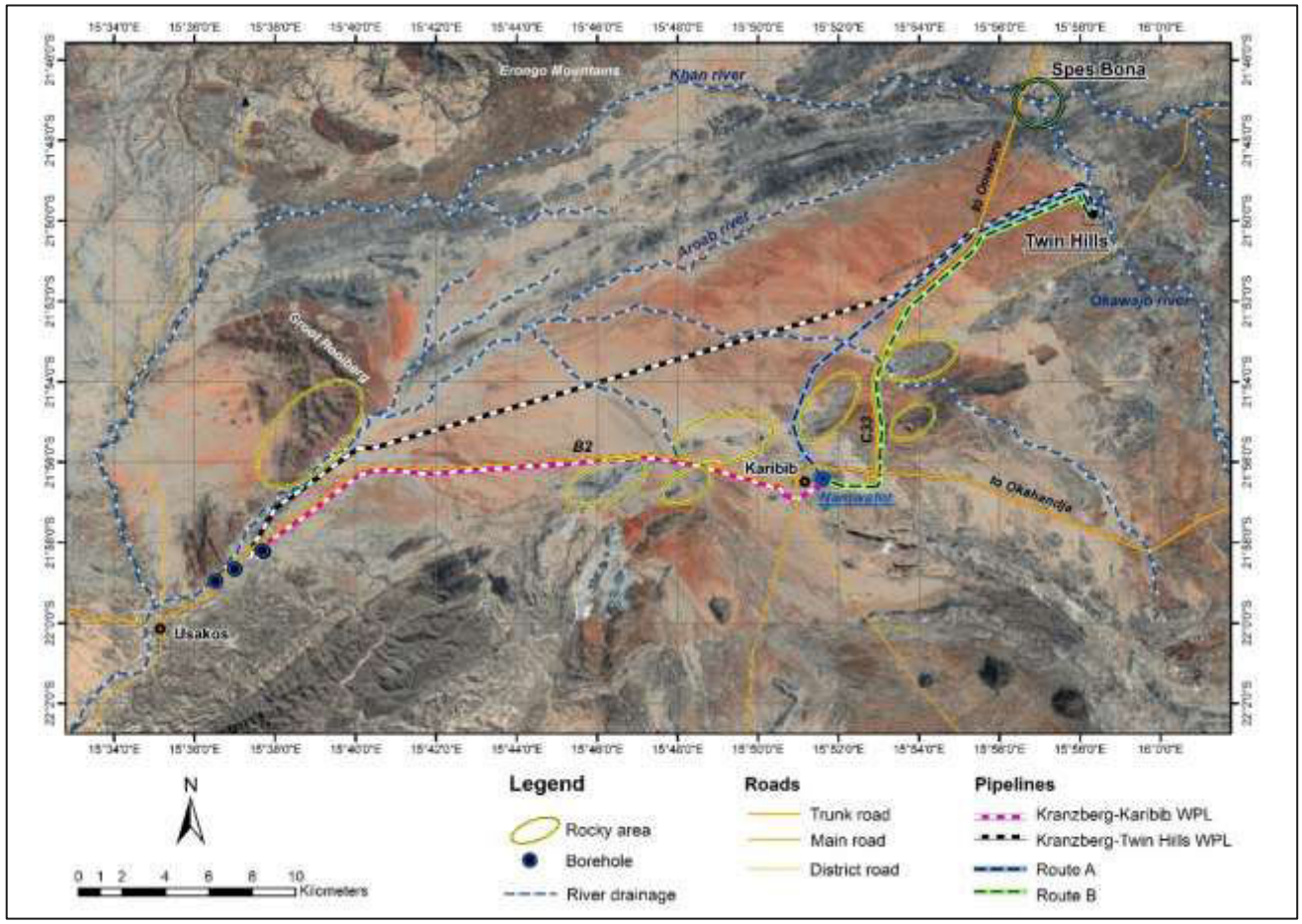

Figure 5-12: The Khan River Water Resources project – pipeline(s) – in the vicinity of Karibib in the Erongo Region. The 2 options include: Option A Kranzberg-Twin Hills (black & white); Option B Kranzberg-Karibib (pink & white) with the Karibib-Twin Hills Options including Route A (blue) and Route B (green). Important drainage lines (blue dotted) and important rocky areas (yellow oblongs) in the proximity to the various pipelines are included (©Jaro Consulting).

5.11 Archaeology Baseline

The Project area lies in the Central Western Plains of the Erongo Region in Namibia. The archaeological record for this area extends to the late Pleistocene era but it is the Holocene human occupation that is most well represented. The Holocene record shows a significant human presence around inselbergen such as the Erongo Mountains during the last 6,000 years where it is consistently associated with rock art sites and evidence of hunter-gatherer occupation and a more recent pastoralist presence. The early precolonial occupation of this area is mainly associated with various Khoekhoegowab-speaking communities, augmented by a significant influx of Otjiherero-speaking groups during the last 350 years when dry conditions in northwestern Namibia occasioned a major population shift. The Ovaherero people who dominated this part of central western Namibia during the late precolonial period came into conflict with German settler and military interests, eventually leading to the revolt and genocide of 1904.

Figure 5-13 shows the location of the Project area in relation to the sub-regional distribution of archaeological sites and in a larger scale map view the distribution of archaeological and historical heritage sites in the immediate vicinity of the two pipeline Options 1 and 2. Where it was possible to examine the pipeline Option 1, the area was also found to be extensively disturbed and it appears that over almost the whole of the Option 1 alignment the pipeline would be laid within a corridor that has already seen the construction of several powerlines and their attendant disturbance of the soil. Figure 5-13 shows one archaeological site directly on the Option 1 alignment; no trace of the site was found, however, and it is presumed to have been destroyed during the upgrading of the Kranzberg railway line. The situation with regard to pipeline Option 2 is essentially similar in that the pipeline would be constructed in an already extensively disturbed area.

In Figure 5-13 archaeological sites are shown as pale red dots, and National Monument sites as green dots. Green squares in Figure 5-13 indicate the position of sites such as concentration camps associated with the 1904 uprising and genocide. Also shown in Figure 5-13 is the historical narrow gauge railway line constructed during the German era.

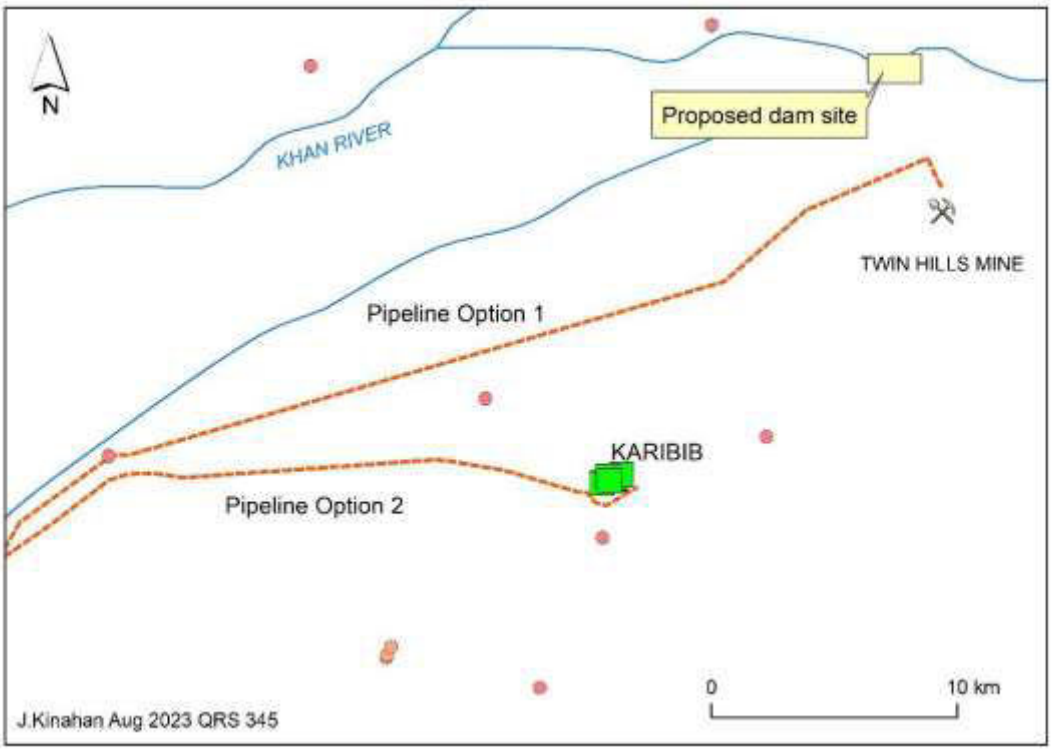

Figure 5-13: The local archaeological setting of the Project area.

Within Karibib itself, the alignment of the Option 2 pipeline is mainly through undeveloped but extensively disturbed parts of the town. Karibib has a number of Proclaimed National Monument sites and these are listed in Table 5-1 together with their geographic co-ordinates. None of the sites are situated close to the proposed pipeline of Option 2. In Namibia proclaimed monuments were in the past heavily biased towards the preservation of colonial sites (Vogt, 2004). Several sites related to the 1904 uprising and genocide are situated in Karibib; these are concentration camp sites whose exact location is not known. In addition to the monument sites there are also two small cemeteries in Karibib. Both are situated close to the proposed pipeline of Option 2 and their locations are as follows: Karibib old cemetery -21.9447230S 15.8438350E; Karibib new cemetery -21.9494860S 15.8503080E.

Table 5-1: National Monument sites in the vicinity of Karibib

Site	Latitude	Longitude	Number
Hälbich Building	-21,93744	15,85205	99/86
Rösemann façade	-21,93716	15,85265	85/79
Hotel zum Grünen Kranze	-21,93585	15,85483	101/86
Proviantamt	-21,93908	15,84769	102/86
Kaiserbrunnen	-21,93635	15,84987	104/86

Site	Latitude	Longitude	Number
Haus Woll	-21,93808	15,85089	100/86
Kubas Station	-22,26872	15,63756	93/83

5.12 Air Quality

Air quality in Namibia is generally good and air pollution is broadly not considered a key issue in Namibia. There are few industrial sources mainly associated with mining and smelting activities, which are generally remote from populated areas (FAO, 2001). Vehicle density and use in the urban areas is not currently sufficient to lead to major problems. Particulate Matter (PM) concentrations in Windhoek have been found to be relatively high due to vehicle exhaust emissions and re-suspension of road dust caused by moving vehicles (Hamtui & Beynon, 2017). Socio-economic activities such as minerals exploration and industrial development in Namibia have the potential to promote fugitive dust production (Von Holdt & Eckardt, 2017), whilst dust particles smaller than 10 µm can pose adverse effects to human respiratory and cardiovascular (Chen et al., 2010; Griffin & Kellogg, 2004; Kanatani et al., 2010). Namibia does not currently have air quality policies, regulations or standards in place (Ehsani, 2017).

5.13 Infrastructure and Bulk Services

The wide tarred B2 road south of the Twin Hills mine area, also known as the Trans-Kalahari Highway, carries large traffic volumes between Windhoek and Walvis Bay, and is considered the regional trade route.

NamWater currently has an unused wellfield in the Khan River, with an associated pumpstation to the northwest of the Twin Hills mine area. A pipeline runs south-south-westwards from there towards Karibib.

Bulk water to Karibib is pumped by NamWater from the Swakoppoort reservoir to a treatment plant in Karibib.

The town is supplied by a 66 kV overhead powerline by ErongoRED, terminating at the Karibib 66/ 11 kV, 2.5 MVA substation.

5.14 Socio-Economic Baseline

Where data is available, the narrative is directly focused on Karibib and Omaruru. However, in some sections, only data on the Erongo Region or at national level is available and relevant.

5.14.1 Regional Overview

Namibia is divided into 14 regions, subdivided by 121 constituencies. The Erongo Region is divided into seven constituencies. The prosed Project is located within the Karibib Constituency. An overview of the two towns as outlined by ECC (2022) closest to the proposed Project is presented in Table 5-2.

Table 5-2: Summary of key socio-economic indicators

Indicator	Erongo Region	Omaruru	Karibib
Population estimate	195 652 (2018)	10 115 (2018)	15 183 (2018)
Gender ratio	53% male, 47% female	52% male, 45% female	48% male, 52% female
Average age	26	25	24
Number of households	57 000	2 400	3 500
Formal houses	65%	70%	67%
Informal houses	33%	28%	31%
Schools	19	Six schools: • 2 government secondary and boarding • 3 government primary • 1 private primary	Five schools: • 2 government secondary • 2 government primary • 1 Pvt primary and secondary
Health facilities	• 4 hospitals • 2 health centres • 18 clinics	• 1 district hospital • 2 private healthcare facilities	• 1 district hospital • 3 clinics

The Erongo Region has a relatively young population, with a median age of 26 years, and over 68% of the urban population are people of working age (between 15 and 59 years) (NSA, 2014). The most common home languages spoken in the region are Oshiwambo languages, spoken by 38.8% of the population. Afrikaans is spoken as a home language by 20.4% of the population, Nama/ Damara by 18.8%, English by 5.3% and German by 2.8% (NSA, 2014).

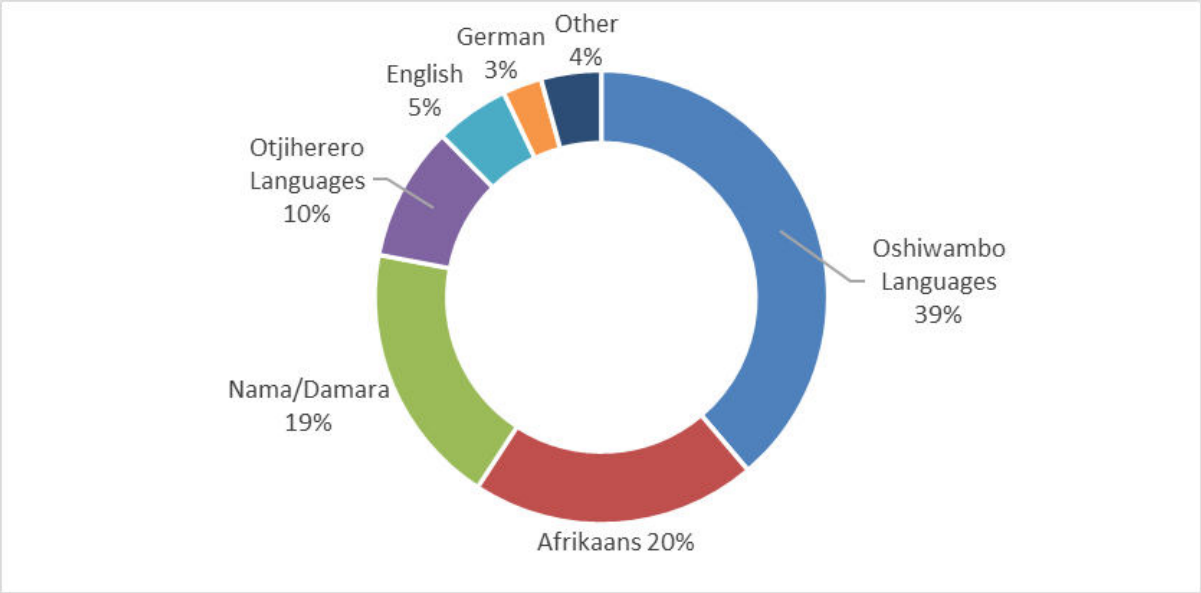

Figure 5-14: Main home language spoken in the Erongo Region
Source: Erongo 2011 Census Regional Profile

5.14.2 Demographics

Namibia is one of the least densely populated countries in the world with a population density of 2.8 persons per km^2. A large portion of the country is not inhabited, whereas other portions accommodate dense concentrations of people. Windhoek is the capital city, with the largest urban population (approximately 268 000 people) in the country (Namibia Population 2022). The next-largest cities are Rundu and Walvis Bay, with approximately 55 000 people each. Karibib, Usakos and Omaruru are located within the Erongo Region and have a population of 10 115 3585 and 15 183 people respectively.

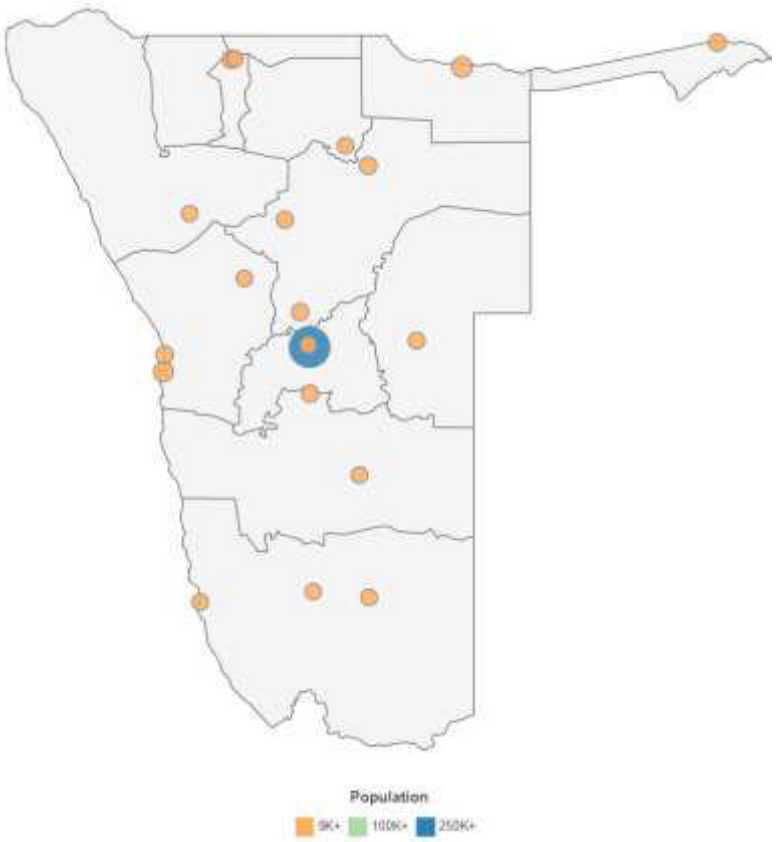

Figure 5-15: Namibia population
Source: (Namibia Population 2022)

5.14.3 Health and Education in Erongo Region

Namibia's government health care system operates on a four-tiered structure consisting of primary health care sites (clinics and health care centres), district hospitals, intermediate hospitals and a referral hospital (Windhoek Central). Clinics are staffed by nurses and pharmacy technicians or assistants, whereas health care centres and hospitals are also staffed by doctors (Christians, 2020). If a patient's medical needs exceed the scope of a given facility, they will be referred up though the hierarchy of care.

Affordability is a key barrier in terms of accessing healthcare. The private sector is sizeable and absorbs roughly 72% of the doctors and just under 50% of registered nurses (Christians, 2020). This means the lack of required staffing in public facilities is particularly problematic as the public health care system serves approximately 85% of the Namibian population (Commonwealth Network, 2021). Additionally, only around 18% of the population is covered by medical aid funds (Christians, 2020). This shows the effect the nation's income disparity has in terms of access to affordable health care.

According to the Ministry of Health and Social Services (MHSS) Master Facility List, the Erongo Region has a total of 18 primary healthcare facilities, including two health centres, and four district hospitals. There are also private hospitals in Swakopmund and Walvis Bay.

5.15 Economic Overview

Namibia's rich mineral base and small population of 2.5 million gives it a World Bank classification of an upper-middle-income country, yet Namibia's level of income inequality is among the highest in the world, with a Gini coefficient of 0.59 (NSA, 2019).

Political stability and social policies since Independence in 1990 have reduced poverty. It has abundant sun, potential for desalinated water from its coastal waters, some remaining fish stocks, widespread livestock production, an increasingly urban population and high school attendance of both girls and boys up to Grade 11.

Tertiary industries have always been the most significant contributor to Namibia's Gross Domestic Product (GDP) in recent years, contributing 58%, in 2019. These industries include the public sector, retail and wholesale, transport and services sectors. Secondary industries contributed 18% to GDP and include manufacturing such as meat and other food processing, beverages, mineral processing, electricity generation and construction. The primary industries contributed 16% to GDP (NPC, 2020).

Namibia faces big constraints imposed by an arid climate, a huge country with low population numbers, and legacies of apartheid and colonialism. It remains one of the most unequal populations in the world with widespread rural and urban poverty, low educational attainment, few technical skills, a major housing back-log and deepening unemployment. Thirty years after Independence from South African rule, the governing political party, SWAPO, is under more pressure than ever before to improve the lives of Namibians.

Although the economy grew between 2010 and 2015 by an average of 5.3% per annum, it has not come out of recession since 2016. The COVID-19 pandemic has negatively impacted commodity export markets, tourism and local consumption patterns and service industries and these resulted in a further 8.5% contraction of the economy in 2020. The Institute for Public Policy Research (IPPR), a Namibian Non-governmental Organisation (NGO) think-tank, summed up the economic situation in July 2020 as:
[12]

> *"Levels of private investment and Foreign Direct Investment, upon which future growth depends, had sunk back to levels not seen since before the Global Financial Crisis. Levels of public investment had also started to decline as the splurge in public spending since 2009 aimed at countering the global downturn petered out while levels of public borrowing reached their limits. Long-standing characteristics, such as poor or non-existent formal employment growth, limited export diversification, the bloated size of the public sector, the generally poor performance of Public Enterprises, and wasteful public spending were all visible. Corruption and mismanagement were widespread as demonstrated most starkly by the Fishrot*

[1] The Gini coefficient can take any values between 0 to 1 (or 0% to 100%). A coefficient of zero indicates a perfectly equal distribution of income or wealth within a population. The data shows that the coefficient generally ranges from 0.24 to 0.63.

[2] https://www.worldbank.org/en/country/namibia/overview#1

> *scandal which had arisen from the secretive way in which one of Namibia's key economic sectors had been managed over many years"* (IPPR 2020).

Local economists, such as the IPPR, broadly agree on the steps needed to get the economy back on its feet. Namibia should devise measures to diversify the economy which is believed to be best driven by the private sector as opposed to government. Strategies for economic recovery according to Dr Haiyambo from the Bank of Namibia include among others investment in Information and Communications Technology (ICT) and digital infrastructure, supporting small and medium enterprises to improve growth in the sector, investing in clean, green and resilient growth and intensifying investment in housing.

6.0 Methodology Used for the Assessment of Impacts

This chapter presents the methodology used for assessing the Impacts identified during the EIA process.

6.1 Introduction

The identification and assessment of environmental impacts is a multi-faceted process, using a combination of quantitative and qualitative descriptions and evaluations. It involves applying scientific measurements and professional judgement to determine the significance of environmental impacts associated with the proposed Project. The process involves consideration of, *inter alia*: the purpose and need for the Project; views and concerns of I&APs; social and political norms, and general public interest.

6.2 Identification and description of impacts

Identified impacts will be described in terms of the nature of the impact, compliance with legislation and accepted standards (where relevant), receptor sensitivity and the significance of the predicted environmental change (before and after mitigation). Mitigation measures may be existing (design) control measures or additional measures that were identified through the impact assessment and associated specialist input (where necessary). The impact rating system considers the confidence level that can be placed on the successful implementation of mitigation.

6.3 Criteria for impact assessment

The criteria for impact assessment significance are provided in Table 6-1 below. Defining the significance of an impact includes a combination of understanding the sensitivity of the environment combined with the magnitude of the impact. The magnitude is determined by understanding the intensity, extent and duration of the impact. The full Impact Assessment Methodology is included in Appendix D.

Table 6-1: Criteria for Assessing Significance
Significance = Sensitivity x Magnitude
Where Magnitude = Intensity + Extent + Duration.

		SENSITIVITY				
		VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
MAGNITUDE	VERY LOW	NEGLIGIBLE	NEGLIGIBLE	VERY LOW	LOW	LOW
	LOW	VERY LOW	VERY LOW	LOW	LOW	MEDIUM
	MEDIUM	LOW	LOW	MEDIUM	MEDIUM	HIGH
	HIGH	MEDIUM	MEDIUM	HIGH	HIGH	VERY HIGH
	VERY HIGH	HIGH	HIGH	HIGH	VERY HIGH	VERY HIGH

7.0 Description of the Environmental Impacts and Risks identified during the Impact Assessment

The potential impacts of the Project described in this chapter have been identified by the EIA project team with input from I&APs and specialist studies. These impacts are initially screened (see Section 7.1) to determine their relevance and the need to be assessed in further detail (in Chapter 8.0).

The sequence in which the assessed issues are listed are in no order of priority or importance. The assessment and rating of potential impacts has been informed by consideration of the Project description, site observations and specialist studies (where applicable). All identified impacts are considered incrementally in the context of the Project and cumulative in the context of existing landscape and infrastructure. The criteria used to assess the impacts and the method of determining the significance of the impacts is outlined in Chapter 6.0. Management and mitigation measures to address the potential changes in impacts are discussed in the EMP (Appendix F).

7.1 Initial Impact Screening

7.1.1 Issue: Loss of soil resources and land capability through contamination

Soils are a significant component of most ecosystems. As an ecological driver, soil is the medium in which most vegetation grows and a range of vertebrates and invertebrates exist. In the context of the local arid environment soils remain important, but are often not present or are mobile and thus of reduced value. The proposed project activities have the potential to cause loss of soil through direct disturbance and contamination by hydrocarbon spillages from construction vehicles. This may occur during operation of plant equipment, refuelling and maintenance of construction vehicles and equipment on incidental events or planned maintenance activities. The potential spillage of effluent from portable toilets is also possible.

However, given the context of the landscape and disturbed nature of the Project site, it is reasonable to conclude the loss of soil resources due to contamination during construction activities within the Project footprint is unlikely and thus not of significance. In addition, management and mitigation measures to limit risks to soil throughout the construction phase are included in the EMP. These measures aim to prevent and minimise the impact of hazardous material spillages by providing measures to ensure adequate storage and handling of hazardous material and regular maintenance of plant equipment. Mitigation measures are provided in the EMP in relation to spill response and action.

The loss of soil resources and land capability through contamination are not considered for further assessment.

7.1.2 Issue: Alteration of visual landscape

The visual character of an area is determined by considering landscape character, scenic quality, sensitivity of the visual resource, sense of place and visual receptors.

The proposed developments are expected to change the visual landscape in a temporary capacity during the construction and to a lesser extent, the decommissioning phases. This is because, there may be temporary stockpiling of material and excavations which will alter the aesthetic of the landscape. During construction the negative visual impact of littering is possible but will be removed during construction rehabilitation. Mitigation measures are provided in the EMP to address the temporary impact. This impact is therefore not assessed in further detail.

7.1.3 Issue: Reduction in groundwater resource reducing availability for use

Water is a scarce resource in Namibia and particularly so in the CA of Namibia. Groundwater is defined as water which is located beneath the ground surface in soil/ rock pore spaces and in the fractures of lithological formations and is a valuable resource. In arid areas groundwater is frequently the sole source of water and thus essential to ecology, agriculture and other development. Groundwater quality and quantity are key indicators of the resource value and status and can have significant effect on the suitability and availability for use. Water will be required for construction personnel (cooking and ablutions) and construction activities (cement mixing, washing of equipment etc.). Contractors will be responsible for sourcing their own water.

During construction the use of water at the quantities required to affect groundwater levels or groundwater availability and borehole yield is unlikely. Nevertheless, groundwater needs to be used sparingly and the management and mitigation measures, as described in the EMP must be implemented. This issue is not assessed further.

The abstraction of water from the Kranzberg aquifer and its associated impacts will be assessed in a separate EIA process and is thus not assessed in this report.

7.1.4 Issue: Loss of heritage/ cultural resources

Heritage (and cultural) resources include all human-made phenomena and intangible products that are the result of the human mind. Natural, technological or industrial features may also be part of heritage resources as places that have made an outstanding contribution to the cultures, traditions and lifestyles of the people or groups of people in Namibia.

The field assessment indicates that no archaeological or historical heritage sites will be affected in any way by the Project design as it currently stands. With a zero to extremely low probability of impact where the consequence of impact would be negligible, i.e. Very Low to Low, the Significance of impact is considered to be negligible. In terms of this assessment there would be no duration of impact and no extent of impact. From this it follows that with an unlikely/ improbable (VL) exposure to impacts the consequence of impact is expected to

be insignificant, and the interpretation of significance is considered to be insignificant, or inconsequential and not requiring any consideration.

7.1.5 Issue: Decline in air quality during construction

There are several activities that have the potential to contribute to the pollution of air. Reduced air quality can result in nuisance conditions and/or health risks. One of these emission sources is dust fallout that has the potential to be a nuisance factor to sensitive air quality receptors. Dust fallout represents the coarse fraction >10μm of total suspended particles that can visually be seen by third parties. Particulate matter (PM) has the potential to contribute to health concerns as PM with an aerodynamic diameter of less than 10μm (PM_{10}) and an aerodynamic diameter of less than 2.5μm ($PM_{2.5}$) is the finer inhalable fraction.

The release of dust particles is primarily associated with land clearing activities, the movement of vehicles and strong winds over exposed surfaces and loose materials. Dust generation would be intermittent during the construction phase. The Project is unlikely to add noticeably to the dust and the severity of the impact is therefore rated as low. SO_2, NO_2 and gaseous emissions will mainly be associated with vehicle emissions and generators. In the local context where pollutant concentrations are very low, the Project related emissions, potentially from dispersed sources, of low volume and for short duration, would not have a significant impact. The operational phase is unlikely to present significant sources of air pollutants and dust. During the decommissioning phases there will be generation of dust through the dismantling and removal of existing infrastructure.

Limited mitigation is proposed in the EMP to manage construction dust and emissions. The significance of the impact is rated as very low without and with mitigation. This issue is not assessed any further.

7.1.6 Issue: Road disturbance and traffic safety

Traffic from construction activities has the potential to affect the capacity of the existing road networks, resulting in public road safety issues as well as on-site safety issues.

The construction phase is likely to produce the most traffic impacts when compared to the operational phase. During construction, activities will likely include the transportation of personnel, materials and equipment to the site. The relatively small scale of construction activities and temporary duration indicates that significant road disturbances are unlikely. This issue is not assessed any further.

7.1.7 Issue: Hazardous excavations and safety impacts to third parties

The presence of project infrastructure has the potential to change the natural topography. A change in topography has the potential to influence surface water flow, the location of soils, the visual character of a landscape and the safety of third parties and animals. The Project activities present infrastructure and/or hazardous excavations that has the potential to alter

the natural topography and in turn has the potential risk of injury and/or harm to both third parties (people) and animals from falling. Given that the following considerations (a) construction activities will be of temporary duration, (b) all individuals involved in construction activities would have received safety and environmental awareness training; and (c) access to site will be restricted. The potential impact of hazardous excavations will not be discussed further as adherence to mitigation measures in the EMP will assist in ensuring safety to third parties.

7.2 Key Potential Environmental and Socio-Economic Impacts and Associated Specialist Studies

The key potential impacts related to the proposed Project, and associated specialist studies, are listed below. The minor impacts are screened in Section 7.1.

7.2.1 Potential Impact on Terrestrial Ecology

The potential impacts in relation to the terrestrial ecology identified and assessed include the following:

- Destruction of vertebrate fauna, especially protected species.
- Destruction of vegetation, especially protected tree/ shrub species.
- Destruction of sensitive habitats.
- Introduction and spread of invasive alien plant species.

How this issue has been addressed in the EIA

A terrestrial ecology assessment was commissioned to assess the potential impacts on terrestrial fauna and flora. The terms of reference for this assessment were as follows:

- Provide a general description of the flora for the Project area, based on current available literature and expert knowledge.
- Describe the terrestrial habitats and species that are likely to be affected by the proposed project activities and infrastructure.
- Identify sensitive habitats and species that may be potentially affected by the Project activities and infrastructure. This shall include species/ habitat of global and national status.
- Identify, describe, and assess the significance of potential impacts of the proposed activities on the local terrestrial ecology and associated habitats.
- Identify practicable mitigation measures to reduce the significance of any negative impacts and indicate how these can be implemented during the execution of the activities.

Impacts on vegetation and terrestrial fauna are assessed in Sections 8.1 to 8.4.

7.2.2 Potential Soil Erosion.

Construction activities could result in soil erosion. Impacts in relation to soil erosion is assessed in Section 8.5

7.2.3 Potential Impact on Archaeological Resources

Construction activities, could result in the disturbance, damage or loss of cultural/ archaeological resources, artefacts, graves, burial sites, etc.

How this issue has been addressed in the EIA

An archaeological assessment was commissioned to assess the potential impacts on archaeological/ heritage sites. The terms of reference for this assessment were as follows:

- Provide a general description of the archaeological/ heritage sites reported in the Project area (as applicable), based on current available literature.
- Provide predictions on the distribution, density, and potential significance of archaeological sites within the Project area.
- Determine and assess potential impacts posed by the Project on archaeological/ heritage and palaeontological sites.
- Identify practicable mitigation measures to reduce the significance of any negative impacts and indicate how these can be implemented during the execution of the activities.

Impacts on archaeology are assessed in Section 7.1.4.

8.0 Impact Assessment

This chapter describes and assesses the significance of potential impacts related to the proposed Project and provides a description of the identified interactions between the Project activities and the receiving environment. This chapter only assesses those potential impacts that required further assessment (as identified in Chapter 7.0).

8.1 Destruction of vertebrate fauna, especially protected species

8.1.1 Description of impact

Trench operations and continuous vehicle movement along the service road(s), would result in the continued destruction of vertebrate fauna (i.e., especially slow-moving species) while open trenches left overnight would act as a giant pitfall trap for various vertebrates.

The impact is assessed to be of high significance before mitigation and very low after mitigation as shown in Table 8-1.

Table 8-1: Impact of destruction of vertebrate fauna

Destruction of vertebrate fauna, especially protected species		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	All	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Prominent change (High)	Minor change (Low)
Duration	Permanent (> 20 years)	Short-term (1 to 5 years)
Extent	Whole site and nearby surroundings	Part of site/ property
Consequence	High	Very low
Probability	Definite/ Continuous (Very high)	Definite/ Continuous (Very high)
Significance	**High -**	**Very low -**
Additional Assessment Criteria		
Degree to which impact can be reversed	*Reversable: If pipeline is buried along the entire route and correct crossing points are used at the appropriate places.*	
Degree to which impact may cause irreplaceable loss of resources	*High: Pipeline is a barrier to domestic stock & non-jumping ungulates & ostrich.*	
Degree to which impact can be avoided	*Very high: Bury pipeline*	
Degree to which impact can be mitigated	*Very high (see below mitigation measures)*	
Cumulative Impact		
Extent to which a cumulative impact may arise	*Possible*	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	High -	**Very low -**

Mitigation Measures:

- Bury pipeline along the entire route;
- Areas not buried due to geological constraints – i.e., aboveground sections – should have wildlife crossing points;
- Wildlife crossing points are not effective as raised crossing points if <100m in length. Rather bury crossing point sections, especially along drainage lines, which serve as movement/ foraging corridors for most wildlife;
- Avoid leaving open trenches overnight and/or have escape routes at either end of the trenches;
- Maintain and enforce track discipline along access route; and
- Place speed humps along access routes to minimise wildlife mortalities.

8.2 Destruction of vegetation, especially protected tree/ shrub species

8.2.1 Description of impact

The land clearing activities by mechanical methods along the pipeline route would result in protected tree species being eradicated. Vertebrate fauna (e.g., cavity dwellers such as bats, gallago, hornbills, parrots, various reptiles, etc. including various raptors e.g., eagles, vultures using such trees as perching/ roosting/ breeding) associated with these trees, especially the old/ large specimens, would be killed and/or displaced.

The impact is assessed to be of medium significance before mitigation and very low after mitigation as shown in Table 8-2.

Table 8-2: Impact of destruction of vegetation, especially protected tree/ shrub species

Destruction of vegetation, especially protected tree/shrub species		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction and Decommissioning	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Prominent change (High)	Minor change (Low)
Duration	Permanent (> 20 years)	Short-term (1 to 5 years)
Extent	Part of site/property	Part of site/ property
Consequence	Medium	Very low
Probability	Definite/ Continuous (Very high)	Definite/ Continuous (Very high)
Significance	**Medium -**	**Very low -**
Additional Assessment Criteria		
Degree to which impact can be reversed	*Reversable: If pipeline route is selected with care so as to avoid unique flora, especially protected species.*	
Degree to which impact may cause irreplaceable loss of resources	*High: Badly selected route could result in numerous protected species being destroyed.*	

Destruction of vegetation, especially protected tree/shrub species		
Degree to which impact can be avoided	*Very high: Responsible route selection prior to construction.*	
Degree to which impact can be mitigated	*Very high (see below mitigation measures)*	
Cumulative Impact		
Extent to which a cumulative impact may arise	*Possible*	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	High -	**Very low -**

Mitigation Measures:

- Remove unique species which are easy to transplant and relocate such as Aloe and Cyphostemma spp. prior to construction activities;
- Avoid the destruction of large/old tree specimens, especially protected species;
- Avoid all areas not directly targeted for the pipeline infrastructures;
- Avoid trees with raptor nests (especially white-backed vulture) as these bird numbers are declining dramatically throughout their range and are classified as critically endangered by the IUCN (2022); and
- Maintain and enforce track discipline.

8.3 Destruction of sensitive habitats

8.3.1 Description of impact

The land clearing activities by mechanical methods, along the pipeline route, would result in some sensitive habitats being destroyed and/or detrimentally affected. Vertebrate fauna and flora associated with these sensitive habitats, would be killed and/or displaced.

The impact is assessed to be of medium significance before mitigation and very low after mitigation as shown in Table 8-3.

Table 8-3: Impact of destruction of sensitive habitats

Destruction of sensitive habitats		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction and Decommissioning	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Prominent change (High)	Minor change (Low)
Duration	Permanent (> 20 years)	Short-term (1 to 5 years)
Extent	Part of site/property	Part of site/ property
Consequence	Medium	Very low
Probability	Definite/ Continuous (Very high)	Definite/ Continuous (Very high)
Significance	**Medium -**	**Very low -**
Additional Assessment Criteria		

Destruction of sensitive habitats		
Degree to which impact can be reversed	*Reversable: If pipeline route is selected with care so as to avoid unique habitats.*	
Degree to which impact may cause irreplaceable loss of resources	*High: Badly selected route could result in sensitive habitats being destroyed.*	
Degree to which impact can be avoided	*Very high: Responsible route selection prior to construction.*	
Degree to which impact can be mitigated	*Very high (see below mitigation measures)*	
Cumulative Impact		
Extent to which a cumulative impact may arise	*Possible*	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	High -	**Very low -**

Mitigation Measures:

- Limit the development to actual sites to be developed and avoid affecting adjacent areas, especially mountainous areas, and ephemeral drainage lines, throughout the entire area;
- Avoid development and associated infrastructure in sensitive areas – e.g., hills and drainage lines in the immediate area (See Section 5.8.). This would minimise the negative effect on the local environment especially unique features serving as habitat to various vertebrate fauna and flora species;
- Maintain and enforce track discipline; and
- Avoid trees with raptor nests (especially white-backed vulture) as these bird numbers are declining dramatically throughout their range and are classified as critically endangered by the IUCN (2022).

8.4 Introduction and spread of invasive alien plant species

8.4.1 Description of impact

Invasive alien plant species would become established on disturbed areas and could also inadvertently continuously be transported into the area as seed on the various vehicles accessing the area.

The impact is assessed to be of high significance before mitigation and low after mitigation as shown in Table 8-4.

Table 8-4: Impact of introduction and spread of invasive alien plant species

Introduction and spread of invasive alien plant species		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	All	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Prominent change (High)	Minor change (Low)

Introduction and spread of invasive alien plant species		
Duration	Permanent (> 20 years)	Short-term (1 to 5 years)
Extent	Whole site and nearby surroundings	Whole site and nearby surroundings
Consequence	High	Low
Probability	Definite/ Continuous (Very high)	Definite/ Continuous (Very high)
Significance	**High -**	**Low -**
Additional Assessment Criteria		
Degree to which impact can be reversed	*Reversable: If all alien invasive plant species encountered along the route are eradicated and alien invasive mitigation is implemented.*	
Degree to which impact may cause irreplaceable loss of resources	*High: No action could result in disturbed areas being colonised by invasive alien species.*	
Degree to which impact can be avoided	*Very high: Eradicate all invasive alien species encountered and implement invasive alien mitigation measures.*	
Degree to which impact can be mitigated	*Very high (see below mitigation measures)*	
Cumulative Impact		
Extent to which a cumulative impact may arise	*Possible*	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	High -	**Low -**

Mitigation Measures:

- Remove and destroy all invasive alien plants encountered throughout the pipeline project area; and
- Ensure that vehicles accessing the project area are free of vegetation, especially if contractors are used which also use their vehicles in urban areas.

8.5 Soil erosion

8.5.1 Description of impact

Typical pipeline operations, including continuous vehicle movement along the various access routes, would result in continued erosion issues if not continuously maintained.

The impact is assessed to be of high significance before mitigation and low after mitigation as shown in Table 8-5.

Table 8-5: Impact of soil erosion

Soil erosion impacts		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	All	
Criteria	**Without Mitigation**	**With Mitigation**

Soil erosion impacts		
Intensity	Prominent change (High)	Minor change (Low)
Duration	Permanent (> 20 years)	Short-term (1 to 5 years)
Extent	Whole site and nearby surroundings	Whole site and nearby surroundings
Consequence	High	Low
Probability	Definite/ Continuous (Very high)	Definite/ Continuous (Very high)
Significance	**High -**	**Low -**
Additional Assessment Criteria		
Degree to which impact can be reversed	*Reversable: If pipeline route is selected with care so as to avoid erosion issues and erosion mitigation is implemented.*	
Degree to which impact may cause irreplaceable loss of resources	*High: Badly selected route could result in severe erosion.*	
Degree to which impact can be avoided	*Very high: Responsible route selection prior to construction and implement erosion mitigation measures.*	
Degree to which impact can be mitigated	*Very high (see below mitigation measures)*	
Cumulative Impact		
Extent to which a cumulative impact may arise	*Possible*	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	High -	**Low -**

Mitigation Measures:

- Implement and maintain erosion control measures where applicable along the access route – i.e., use the same tracks; cross drainage lines at right angles;
- Rehabilitate eroded areas annually – i.e., after the rainy season (during winter months); and
- Maintain track discipline – i.e., no offroad driving; speed control; use the same track, etc.

9.0 Conclusion and Recommendations

This chapter concludes on the key impact assessment findings and makes a recommendation and conclusion regarding the issuing of an ECC for the proposed Project.

9.1 Impact Assessment and key mitigation summary

The impacts associated with the proposed project is presented in Chapter 8. The most significant impacts are related to the following:

- Destruction of vertebrate fauna, especially protected species: Trench operations and continuous vehicle movement along the service road(s), would result in the continued destruction of vertebrate fauna (i.e., especially slow-moving species) while open trenches left overnight would act as a giant pitfall trap for various vertebrates. The impact is assessed to be of **very low** significance after mitigation.
- *Destruction of vegetation, especially protected species:* The land clearing activities by mechanical methods along the pipeline route would result in protected tree species being eradicated. Vertebrate fauna (e.g., cavity dwellers such as bats, gallago, hornbills, parrots, various reptiles, etc. including various raptors e.g., eagles, vultures using such trees as perching/ roosting/ breeding) associated with these trees, especially the old/ large specimens, would be killed and/or displaced. The impact is assessed to be of **very low** significance after mitigation.
- Destruction of sensitive habitats: The land clearing activities by mechanical methods, along the pipeline route, would result in some sensitive habitats being destroyed and/or detrimentally affected. Vertebrate fauna and flora associated with these sensitive habitats, would be killed and/or displaced. The impact is assessed to be of **very low** significance after mitigation.
- Introduction and spread of alien invasive plant species: Invasive alien plant species would become established on disturbed areas and could also inadvertently continuously be transported into the area as seed on the various vehicles accessing the area. The impact is assessed to be of **low** significance after mitigation.
- Soil erosion: Typical pipeline operations, including continuous vehicle movement along the various access routes, would result in continued erosion issues if not continuously maintained. The impact is assessed to be of **low** significance after mitigation.

The field assessment indicates that no archaeological or historical heritage sites will be affected in any way by the Project design as it currently stands. With a zero to extremely low probability of impact where the consequence of impact would be negligible, i.e. Very Low to Low, the Significance of impact is considered to be negligible. In terms of this assessment there would be no duration of impact and no extent of impact. From this it follows that with an unlikely/improbable (VL) exposure to impacts the consequence of impact is expected to be insignificant, and the interpretation of significance is considered to be insignificant, or inconsequential and not requiring any consideration.

The management and mitigation measures are included in more detail in the EMP (refer to Appendix F). To ensure compliance with the EMP it is recommended that an ECO is appointed during construction.

9.2 Concluding statement

Osino is still investigating other water sources, despite the success of the water supply investigations undertaken to date on the Karibib Marble Aquifer. The aim is to ensure water security and minimise potential impact of local sources owning to the fact that the Twin Hills Gold project is located in the water scarce Central Areas of Namibia (CAN).

Options under investigation include the Kranzberg Aquifer from where a water pipeline is proposed to be developed in collaboration with the Namibia Water Corporation Ltd (NamWater). The pipeline will start from boreholes taping the aquifer and transferring water via Karibib to the Twin Hills Gold Mine.

The Project triggers listed activities in terms of the EIA Regulations 2012 promulgated under the Environmental Management Act, 2007 (No. 7 of 2007) (EMA). An ECC is required from the MEFT. With the Ministry of Agriculture, Water and Land Reform (MAWLR) as the Competent Authority that needs to be engaged.

Therefore, SLR Environmental Consulting Namibia (Pty) Ltd (SLR) was commissioned by Osino to undertake the EIA for the water pipeline proposed from the Kranzberg Aquifer boreholes to the Twin Hills Mine in the Erongo Region.

The work undertaken in support of this ECC Application has been completed in line with the applicable regulatory framework. The assessment process followed included the undertaking of two specialist assessments deemed necessary to adequately identify and assess these potential impacts.

Following the impact assessment process, the identified residual impacts are assessed to be of **LOW** significance with the implementation of the recommended mitigation measures. The potential impacts can be adequately mitigated with the implementation of the proposed mitigation measures (as included in the EMP), which follows the principle of the mitigation hierarchy by firstly avoiding identified sensitive areas, and then reducing/ minimising the impact, and lastly rehabilitating disturbed sites.

Based on the findings of the EIA and associated specialist studies, SLR is of the opinion that this EIA Scoping Report and EMP is sufficiently robust and provides sufficient information for MAWLR and MEFT to make an informed decision on the proposed Project taking into consideration the significance of potential impacts.

SLR recommends that the commitments presented in the EMP should be conditional to the ECC, should MEFT approve the application.

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