



LODESTONE NAMIBIA (PTY) LTD

**PROPOSED NEW WATER PIPELINE FROM THE OANOB
DAM TO THE DORDABIS IRON ORE MINE**

SCOPING (INCLUDING IMPACT ASSESSMENT) REPORT

Prepared for: Lodestone Namibia (Pty) Ltd

September 2023



DOCUMENT CONTROL

Report Title	SCOPING (INCLUDING IMPACT ASSESSMENT) REPORT FOR LODESTONE'S PROPOSED NEW BULK WATER PIPELINE FROM THE OANOB DAM TO THE DORDABIS IRON ORE MINE
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Project Number	NSP2023LS2
Report Number	1
Status	Final
Issue Date	September 2023

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EXECUTIVE SUMMARY

1. GENERAL INTRODUCTION

Lodestone Namibia (Pty) Ltd (Lodestone) intends to construct a buried bulk water pipeline to supply water from the Oanob Dam to the mine site. Lodestone approached NamWater in 2014 to discuss this possibility, and although NamWater confirmed the availability of the required water supply, the formal agreement between Lodestone and NamWater still needs to be formulated.

The proposed pipeline follows a route indicated in Figure A and will pass through farmlands, following existing district roads. A new above-ground powerline will also be installed over a section parallel to the water pipeline to provide power to two booster pump stations.

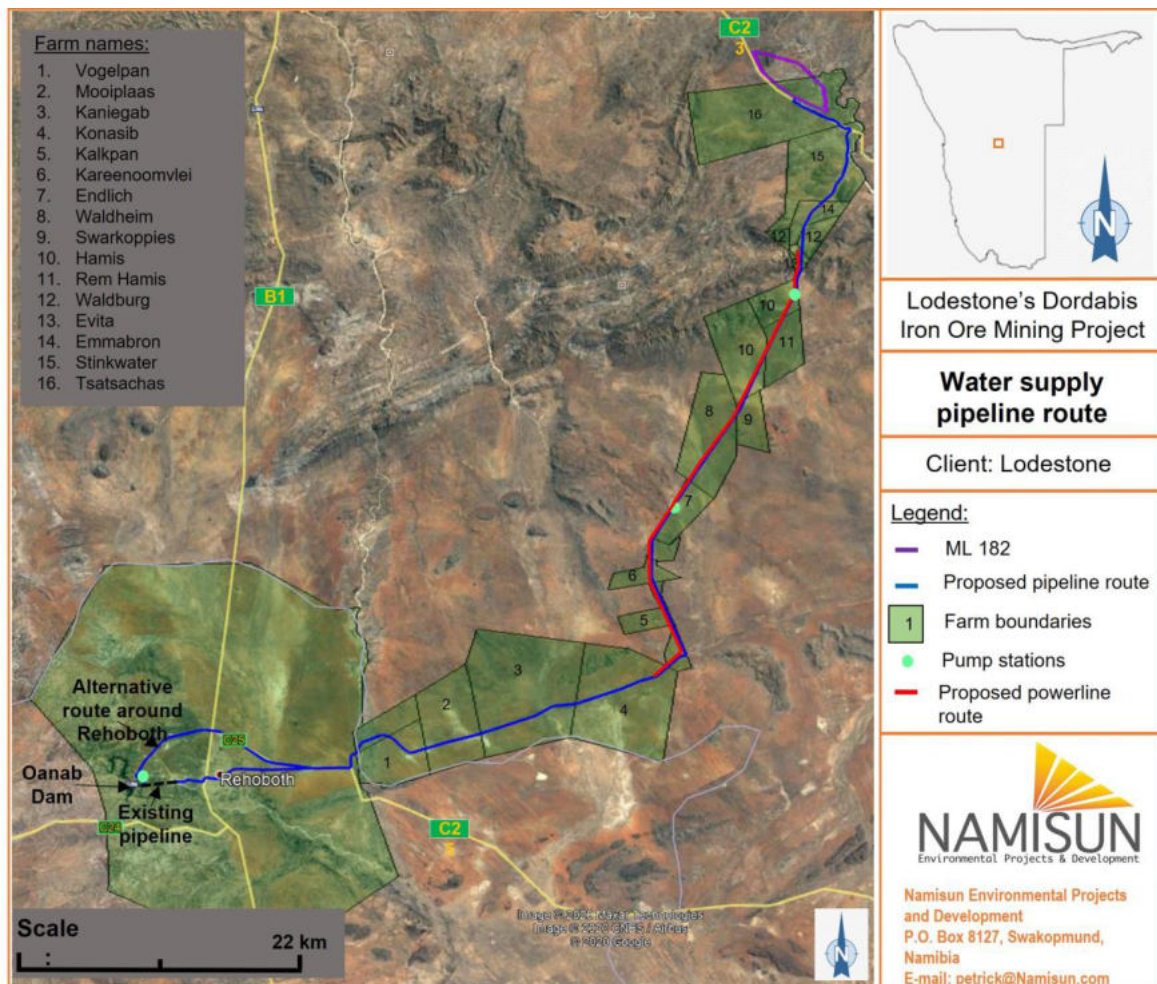


FIGURE A: PROPOSED ROUTE OF THE BULK WATER SUPPLY PIPELINE

This Scoping (including impact assessment) Report summarises the Environmental Impact Assessment (EIA) process being followed for Lodestone's proposed bulk water supply pipeline. It includes an assessment of the environmental impacts that the proposed project is likely to have. The proposed management and mitigation measures relating to the proposed project are documented in the Environmental Management Plan (EMP), which accompanies this report.

2. ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

EIAs are regulated by the Ministry of Environment, Forestry and Tourism (MEFT) in terms of the Environmental Management Act, 7 of 2007. This Act was gazetted on 27 December 2007 (Government Gazette No. 3966) and its associated regulations were promulgated in January 2012 (Government Gazette No. 4878). The EIA process steps for the proposed project are explained diagrammatically in Figure B.

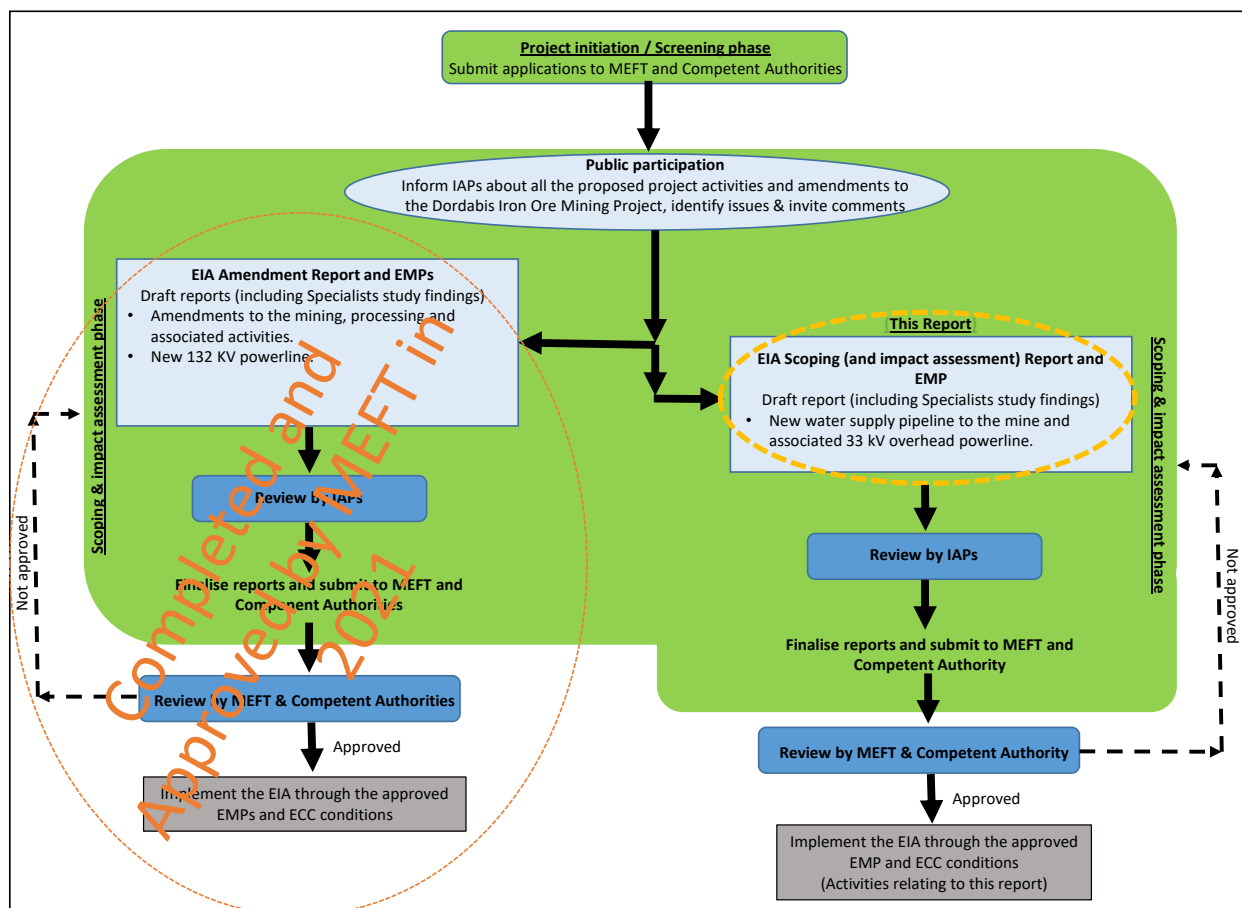


FIGURE B: THE EIA PROCESS FOR THE PROPOSED PROJECT

Prior to the commencement of the proposed pipeline, an application for an environmental clearance will be submitted in terms of this Act and the associated EIA Regulations to the Ministry of Agriculture, Water and Land Reform (MAWLR), as the competent authority. MAWLR will review the application and relevant reports and submit comments to the Ministry of Environment, Forestry and Tourism (MEFT) for the review and decision making.

Registered Interested and Affected Parties (I&APs) were given an opportunity to comment on this Scoping (including Impact Assessment) Report. The comment period was from 18 August 2023 to 18 September 2023. Once the comment period closed, the documents were updated and finalized, with due consideration of the comments received, for submission to the MAWLR and the MEFT for decision-making.

2.1 EIA Team

Namisun Environmental Projects and Development (Namisun) is an independent environmental consultancy firm appointed by Lodestone to undertake this EIA.

Werner Petrick, the EIA project manager has more than twenty-four years of relevant experience in conducting / managing EIAs, compiling EMPs and implementing EMPs and Environmental Management Systems. Werner has a B. Eng (Civil) degree and a master's degree in environmental management and is certified as lead environmental assessment practitioner (EAP) and reviewer under the Environmental Assessment Professionals Association of Namibia (EAPAN).

Dr Pierré Smit, the project coordinator, holds a PhD in Landscape Ecology and has more than twenty-eight years of experience in environmental management, managing environmental assessment and the implementation of EMPs and Environmental Management Systems in Namibia.

2.2 Steps in the public participation process

The steps that were followed as part of the consultation process are summarised below:

- Namisun notified the authorities MEFT and MAWLR in May and June 2020 of the proposed project through a Background Information Document (BID). The application for authorization form was submitted to MAWLR (as the competent authority) and the application was registered onto MEFT's online registration system.

- Namisun developed an EIA I&AP database. This database was updated as and when required, throughout the EIA process.
- Copies of the BID were distributed via email to the I&APs and hard copies were made available on request. The purpose of the BID was to inform I&APs and authorities about the proposed activities, the EIA process being conducted, possible environmental impacts and ways in which I&APs could provide input to Namisun.
- Site notices for the overall Dordabis Iron Ore Mining Project were placed at five locations. This was done to notify I&APs of the proposed project; the EIA process being following and who to contact for further information requirements.
- Block advertisements were placed in the Market Watch as part of the following newspapers:
 - *The Namibian Sun* (24 and 31 July 2020)
 - *Die Republikein* (24 and 31 July 2020)
 - *Allgemeine Zeitung* (24 and 31 July 2020)
- Engagement, communications and interactions with stakeholders entail:
 - Focus group meetings with key stakeholders - face-to-face, via Zoom-calls and telephonic discussions.
 - Follow-up telephonic conversations and email communications with I&APs to confirm the contact details of stakeholders on the database.
 - Landowners along the pipeline route were visited face-to-face and the project was discussed with them individually.
- Electronic copies of the draft Scoping Report and EMP (excluding the appendices) were sent to stakeholders with email access during the public review period between 18 August and 18 September 2023.
- Hard copies of the Executive Summary were made available to I&APs without email access. Electronic copies of the draft Scoping Report and EMP (excluding the appendices) were available on request to Namisun during the public review period.
- I&APs had the opportunity to review the draft report and submit comments in writing to Namisun before 18 September 2023.

Lodestone issued an update on their Iron Ore Project to all “Lodestone I&APs” during October 2023 to provide clarity on its various components and the associated assessment processes. Lodestone therefore sent out an email to all I&APs on the “overall project database” to provide relevant information, including the current EIA Application process for the pipeline being finalised.

3. DESCRIPTION OF THE PROPOSED PROJECT

Recent water supply requirements for Lodestone's proposed Dordabis Iron Ore Mining Project on ML 182 were determined at 2.0 million cubic meters per annum (Mm³/a). It was independently assessed that the potential water supply from the Oanob Dam would be sufficient for the project needs. It must be stated that Lodestone had consultations with NamWater in 2019, 2020 and 2021 and independent verification of the abstraction rates were presented during these sessions. Based hereupon, it is proposed that bulk raw water will be supplied by NamWater with a ~102 km long buried pipeline, for mining, processing, and associated activities during operations of the full-scale project.

3.1 Project location

The location of the proposed pipeline is indicated in Figure A.

3.2 Project design and proposed activities

An offtake point for the proposed water pipeline is planned below the wall of the Oanob Dam. The offtake will provide water to a 2,000 m³ ground level reservoir at the base pump station, to ensure a consistent flow from the base station into the pipeline. Two more booster pump stations are planned along the pipeline, each with a 500 m³ ground level reservoir for control purposes.

From the base station at the Oanob Dam, the route of the pipeline will go along one of the two access roads to the dam, across the B1, eastwards along the north side of the C25 to Rehoboth Station and further along the D1228. Here the pipeline turns sharply northwards and run along the western side of D1249 to the C23, where it will turn westwards along the south side of the C23 to the mine.

An earth embankment with a smooth 1.5 mm HDPE lining will act as a terminal water reservoir onsite, to where the water will be supplied by the pipeline.

A new dedicated 33 kV above-ground powerline will be installed along a section of the pipeline to provide power to two booster pump stations. This powerline will run from a connection with the existing 33 kV Seeis-Dordabis distribution line to the main (base) pump station via the two booster pump stations, over 38 km along the D1249 gravel road, and adjacent to the proposed new water pipeline.

Since no infrastructure is allowed within the road reserve of any Namibian public road, a 15 m wide servitude will be created on farmland 5 m outside the road reserve boundary and the same servitude will be used for the powerline.

3.3 Construction activities

The following activities are expected:

- Surveying and setting out of the final pipeline / powerline route.
- Clearing the servitude (from large trees, shrubs, bushes, etc.).
- Pegging of the pipeline and powerline.
- Trenching and excavations for the pipeline.
- Drilling of holes by means of a compressor drill rig for the poles of the powerline.
- Drilling and blasting, where required.
- Cleaning, grubbing and bulldozing.
- General earthworks, including levelling and piling of soil.
- Excavations for foundations.
- Planting of poles for the powerline, using a 4x4 truck.
- Storage and handling of material (sand, rock, cement, chemical additives) in work areas.
- Water utilization.
- Operation and movement of construction vehicles.
- Refuelling of equipment.
- Handling, storage, and transportation of non-hazardous and hazardous waste.
- Disposal or treatment of contaminated soil.

All the components for the water pipeline and powerline construction will be transported to site by road on low-bed trailers. No significant impacts associated with traffic interruption are expected on these roads due to the construction activities.

Concrete will be mixed and poured onsite; subsequently all concrete constituents (crushed stone, cement, water, and sand) will have to be transported to site.

3.4 Employment and accommodation of workers

At least two teams will conduct work on this project, starting from opposite ends to the middle. Not more than 40 people per team is expected.

Typically, temporary construction camps accommodating the workforce will be located close to the work area. These sites will have to be negotiated with the applicable farm owners.

3.5 Access roads

As the pipeline will run along the reserves of existing roads, the main access to the pipeline will be from the reserves of the existing roads, i.e. the B1, the C25, the D1228, the D1249 and the C23 roads. In liaison with landowners, local tracks will be used where additional access is necessary.

3.6 Hazardous substances

Diesel will be used for vehicles and generators, petrol will be used for vehicles and oil, grease and lubricants will be used by vehicles and equipment. Existing suppliers in Windhoek and Rehoboth will be used and no storage onsite will be done.

3.7 Waste management

Non-hazardous domestic and industrial waste, in relatively small volumes, as well as hazardous industrial waste (e.g., hydrocarbons) will be generated during the construction phase.

All waste will be contained in a manner that there can be no discharge or contamination and will be removed from site daily, for disposal at permitted landfill sites at Rehoboth and Windhoek. Recyclable items are to be sorted and stored in temporary containers and removed to relevant recycling centres (where possible). Hydrocarbon waste and potential hydrocarbon spills from vehicles and machinery will be scooped into bags and taken to a permitted disposal site.

3.8 Sanitation

Portable toilets and ablution facilities will be placed onsite to ensure that sewage is contained and disposed of appropriately.

3.9 Fire management

Active areas will be cleared of grass, dry wood and anything that might increase the risk of starting an unintentional fire. Smoking will only be allowed in dedicated smoking areas. No open fires for cooking will be permitted. Gas stoves will be used when required. Fire extinguishers will be available onsite.

3.10 Construction phase timing

Commencement of construction is subject to regulatory approval as well as the formulation of an agreement between NamWater and Lodestone. Lodestone plans to commence with full-scale operations at the mine towards 2025 / 2026, when the 2.0 Mm³ water per annum would be required. Construction of the proposed pipeline and powerline would take approximately 12-18 months.

4. IDENTIFICATION AND DESCRIPTION OF POTENTIAL ENVIRONMENTAL IMPACTS AND ASSESSMENT FINDINGS

The following issues were identified by the environmental team, in consultation with stakeholders, and require further assessment:

- Impacts on flora.
- Impacts on fauna.
- Impacts on avifauna (with specific reference to the accompanying powerline).
- Impacts on soil.
- Impacts on archaeology.
- Visual impacts (associated with the new powerline).

The outcome on the assessment is described in Chapter 8 of this document. A summary of the assessment findings is presented in Table A.

TABLE A: SUMMARY OF POTENTIAL IMPACTS ASSOCIATED WITH THE PROPOSED BULK WATER SUPPLY PIPELINE AND RELATED POWERLINE

POTENTIAL IMPACT	SIGNIFICANCE	
	Before mitigation	After mitigation
Potential negative biological impacts		
Physical destruction of vegetation and associated habitats, particularly sensitive habitats and protected plant species	H	M
Illegal harvesting of camelthorn wood or aloes	L	L
Physical destruction of habitats and animals	M	M
Poaching, killing of animals and the illegal collecting of animals	L	L
Noise, dust, light, and chemical pollution	L	L
Rehabilitation and decommissioning	L	L
Disturbance of birds during construction	M	L
Collision of birds with overhead powerline	M-H	L-M

POTENTIAL IMPACT	SIGNIFICANCE	
	Before mitigation	After mitigation
Electrocution of birds on overhead powerline	M-H	L
Bird nesting on overhead powerline	M-H	L
Potential negative impacts on soil		
Disturbance to soil with resulting erosion	H	L
Establishing of alien invasive species on areas of disturbance	M	L
Potential negative impacts on archaeology		
Disturbance and damage to heritage sites	L	L
Potential negative visual impacts		
Reduced visual resources for sensitive receptors relating to the 33kV powerline, reservoirs, and pump stations	M	L-M

5. WAY FORWARD

For the way forward the final report (including the comments from I&APs) will be submitted to the MAWLR and MEFT for their review and decision.

6. ENVIRONMENTAL IMPACT STATEMENT AND CONCLUSIONS

Namisun believes that a thorough assessment of Lodestone's proposed bulk water supply pipeline and associated infrastructure has been achieved and that an environmental clearance certificate could be issued on condition that the management and mitigation measures in the EMP be adhered to.

SCOPING (INCLUDING IMPACT ASSESSMENT) REPORT FOR LODESTONE'S PROPOSED NEW BULK WATER PIPELINE FROM OANOB DAM TO THE DORDABIS IRON ORE MINE

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ACRONYMS AND ABBREVIATIONS

Below is a list of acronyms and abbreviations used in this report.

Acronyms / Abbreviations	Definition
COW	City of Windhoek
DEA	Department of Environmental Affairs
EAP	Environmental Assessment Practitioner
EAPAN	Environmental Assessment Professionals Association of Namibia
ECC	Environmental Clearance Certificate
EMS	Environmental Management System
EPL	Exclusive Prospecting License
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ha	hectare
HDPE	High density polyethylene
I&AP	Interested and Affected Party
IRR	Issues and Response Report
km	kilometre
kV	kilovolt
ha	hectares
m	metre
m ³	cubic metre
m/s	metre per second
MAWLR	Ministry of Agriculture, Water and Land Reform
MET	Ministry of Environment and Tourism
MEFT	Ministry of Environment, Forestry and Tourism
ML	Mining Licence
Mm ³ /a	Million cubic meters per annum
MME	Ministry of Mines and Energy
NBRI	National Botanical Research Institute
Pty Ltd	Proprietary Limited
PVC	Polyvinyl chloride
QDS	Quarter Degree Square

SCOPING (INCLUDING IMPACT ASSESSMENT) REPORT FOR LODESTONE'S PROPOSED NEW BULK WATER PIPELINE FROM OANOB DAM TO THE DORDABIS IRON ORE MINE

1 INTRODUCTION

This chapter describes the purpose of this Scoping (including impact assessment) Report, briefly describes the background, location and history of the project and the Environmental Impact Assessment (EIA) process to be followed, summarizes the applicable legislative requirements, explains the report structure, summarizes the assumptions and limitations relevant to this report, and explains how the input from Interested and Affected Parties (I&APs) was included.

This Scoping (including impact assessment) Report has been compiled as part of the EIA process for the proposed amendments to the “Dordabis Iron Ore Mining Project and Associated Infrastructure” of Lodestone Namibia (Pty) Ltd (Lodestone).

The report describes and assesses specifically the following activities:

- Construction and operation of Lodestone’s proposed new bulk water supply pipeline from the Oanob Dam near Rehoboth to the Dordabis Iron Ore Mine.

Registered I&APs were provided with the opportunity to comment on this report (see Section 1.5). Once the comment period closed, the documents were updated and finalized with due consideration of the comments received, and submitted to the Ministry of Agriculture, Water and Land Reform (MAWLR) (i.e. the competent authority) and the Ministry of Environment, Forestry and Tourism (MEFT) for decision-making.

1.1 BACKGROUND, LOCATION AND HISTORY OF THE PROJECT

Lodestone, a privately funded mining company, holds Mining Licence (ML) 182 within their Exclusive Prospecting License (EPL) 7352 area, which is situated in the Khomas Region, approximately 20 km northwest of Dordabis and 75 km southeast of Windhoek on the C23 tar road (see Figure 1).

Lodestone is in the process of developing an open pit mine and processing plant at the Dordabis Iron Ore Mining Project on ML 182 – to produce 68 % high-grade iron ore concentrate for export.

Between 2011 and 2013 Lodestone undertook an EIA process for a proposed iron ore mine and processing plant with associated infrastructure and activities on their EPL area. Based on the approved EIA Report and accompanying Environmental Management Plan (EMP) the Office of the Environmental Commissioner at the Directorate of Environmental Affairs (DEA), of the former

Ministry of Environment and Tourism (MET), now MEFT, issued an Environmental Clearance Certificate (ECC) to Lodestone in July 2014.

In December 2019 Lodestone submitted a renewal application of the ECC to the MEFT. The application for the renewal, however, was for a much-reduced scale in activities on ML 182 (i.e. small-scale magnetite mining). MEFT issued the renewed ECC to Lodestone in June 2020.

Subsequently, Lodestone has finalized the Feasibility Study for the originally planned “Dordabis Iron Ore Mining Project and Associated Infrastructure” on ML 182 in 2020, and thereby proposed several changes to the previously assessed / approved (2013 EIA) project (i.e. the original bigger scale project). The key changes are summarised below:

- Mining and processing (ECC issued by MEFT in 2021 based on an approved Amendment Application and EIA reports):
 - All proposed mining activities are now restricted north of the C23 road, resulting in an amended layout of the mine.
 - Change in design of the two pits of the mine.
 - Increase in mining rate and processing.
 - Change to the disposal of mineralized waste.
- Power supply (ECC issued by MEFT in 2021 based on an approved new application and EIA reports):
 - Construction of a new overhead powerline from the Auas substation to the mine.
- Transport of the final product (i.e. iron concentrate) in bulk from the mine to the port of Walvis Bay for export.
 - Alternatives to rail transport are still being investigated.
- **Water supply (relevant to this report):**
 - **Construction of a proposed new bulk water supply pipeline from the Oanob Dam near Rehoboth to the Dordabis Iron Ore Mine (see Figure 1 and 2), which will pass through farmlands, following existing district roads. A new 33 kV above-ground powerline will also be installed over a section parallel to the water pipeline to provide power to the booster pump stations along the way.**

Lodestone is busy to develop the Dordabis Iron Ore Mining Project in phases, as follows:

- Phase 1 is a demonstration phase, which will commence once the project is fully funded in 2023 / 2024. This phase includes “small-scale” mining and processing activities, producing up to a maximum of ~ 750,000 to 800,000 tons iron concentrate per annum, and by installing a “demonstration plant”.
- Phase 2 is a “full-scale project” planned to produce up to a maximum of 2.5 million tons iron concentrate per annum.



FIGURE 1: REGIONAL LOCALITY OF ML 182 (PROJECTED ON GOOGLE EARTH)

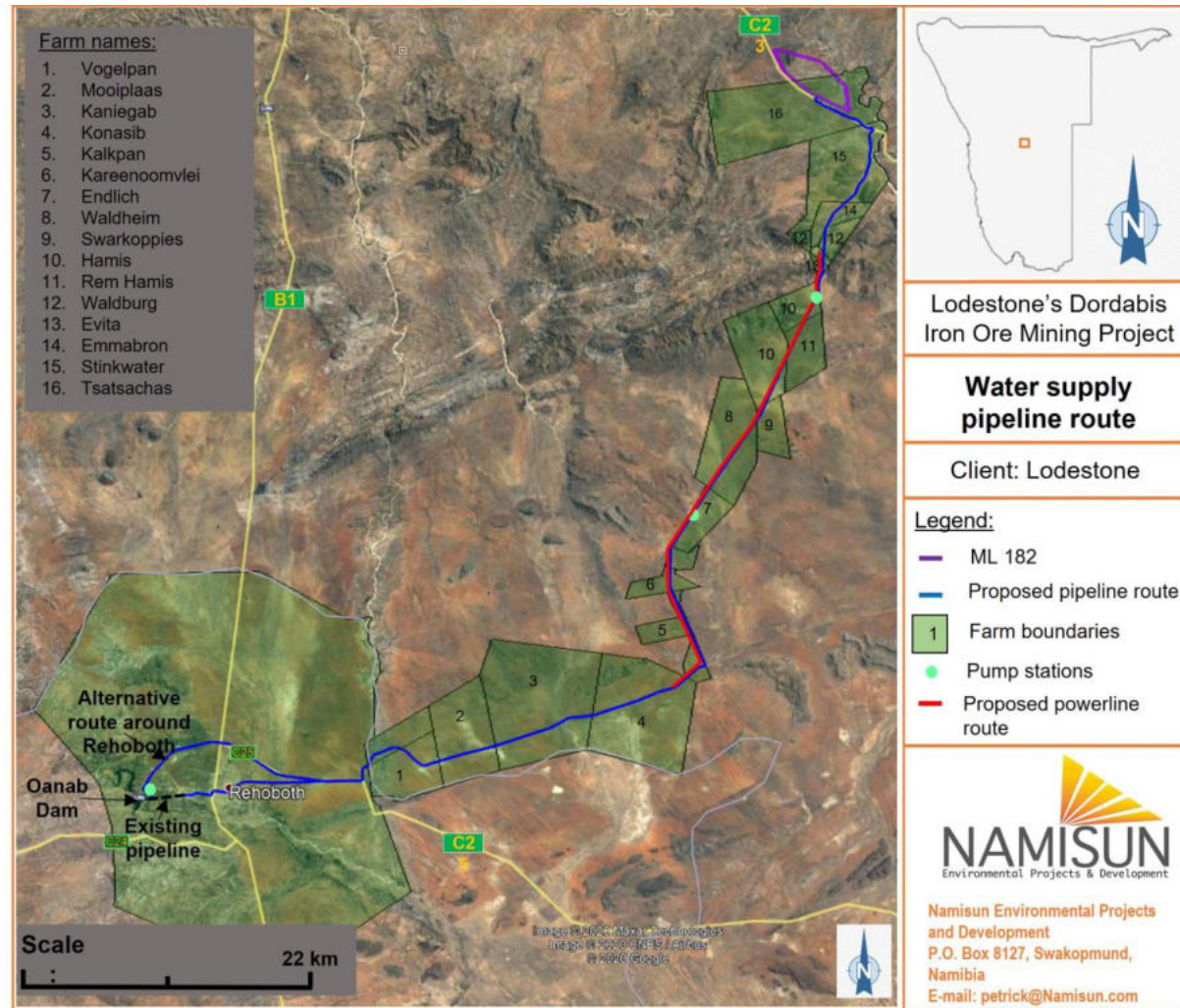


FIGURE 2: PROPOSED PIPELINE (AND ASSOCIATED POWERLINE) ROUTES PROJECTED ON GOOGLE EARTH

Prior to the construction of the proposed new bulk water supply pipeline and associated infrastructure, environmental clearance is required from the DEA of the MEFT, based on an approved EIA process, in terms of the Environmental Management Act, No. 7 of 2007 and its associated regulations of 2012.

1.2 MOTIVATION (NEED AND DESIRABILITY) FOR THE PROPOSED PROJECT

The overall motivation (i.e. the need and desirability of the originally planned “Dordabis Iron Ore Mining Project and Associated Infrastructure” on ML 182) was described before in the 2013 EIA (Colin Christian & Associates CC, 2013) as well as in the EIA Amendment Report (Namisun, 2020) for the proposed changes to the “Dordabis Iron Ore Mining Project and Associated Infrastructure”.

Lodestone will require $\pm 600,000$ to $700,000$ cubic meters per annum (m^3/a) water for mining, processing, and associated activities during the demonstration phase of the project. The water demands associated with the demonstration phase of the project were assessed as part of the 2020 EIA Amendment process and report (Namisun, 2020) and approved by MEFT (in 2021). The two existing boreholes onsite are utilised to supply limited potable water to the plant site, admin buildings, logistics buildings and mining yard as well as supplement some of the process water requirements.

Enough water from the boreholes onsite to meet the demands for the demonstration phase is not feasible. Water requirements for the full-scale project is proposed at 2.0 million cubic meters per annum (Mm^3/a), which is significantly more than during the demonstration phase. As a result, Lodestone approached NamWater since 2014 to discuss the possibility of water supply to the mine from the Oanob Dam – for both phases of the project.

NamWater has (informally) confirmed the availability of the required water supply to the mine but the formal agreement between Lodestone and NamWater still needs to be formulated. Lodestone had consultations with NamWater in 2019, 2020 and 2021 and independent verification of the abstraction rates were presented during these sessions. As part of the current assessment process, the matter of a bulk water supply agreement was discussed during a Zoom Call between NamWater, the Department of Water Affairs, Lodestone and Namisun on Monday 2 October 2023 (see the attachment of the minutes of the meeting under Appendix C).

Depending on the eventual agreement between the two parties (i.e. NamWater and Lodestone) for the supply of water from the Oanob Dam to the mine, a proposed bulk water pipeline between the dam and the mine needs to be constructed for the transfer of the water – the focus of this document.

1.3 THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS TO BE FOLLOWED

EIAs are regulated by the MEFT in terms of the Environmental Management Act, No. 7 of 2007. This act was gazetted on 27 December 2007 (Government Gazette No. 3966) and its associated regulations were promulgated in January 2012 (Government Gazette No. 4878).

1.3.1 PREVIOUS EIAs COMPLETED AND APPROVED

EIAs completed for the “Dordabis Iron Ore Mining Project and Associated Infrastructure” on ML 182, and the relevant ECCs issued by the DEA of the MEFT so far, can be summarised as follows:

- Lodestone undertook an EIA process for the proposed original and larger scale iron ore mine, processing plant and associated infrastructure and activities on the EPL area, between 2011 and 2013 and received environmental clearance from the MET (now MEFT) in July 2014.
- Lodestone proceeded with small-scale magnetite mining activities and subsequently submitted an ECC renewal application to MEFT in December 2019 for the much-reduced scale in magnetite mining activities on ML 182. A renewed ECC was issued by MEFT to Lodestone in June 2020.
- Lodestone proposed several changes to the previously assessed / approved (2013 EIA) project scope relating to the “original bigger scale project”. A parallel EIA process commenced in 2020 for the following applications:
 - Amendment to the Dordabis Mine and Associated Activities. This application was approved by MEFT in 2021, following the submission of the EIA (Amendment) Report and Amended EMP.
 - A proposed new 132 kV overhead power supply line from the Auas substation to the mine. This application was approved by MEFT in 2021, following the submission of the EIA report and a powerline specific EMP).

To obtain a secure supply of water, Lodestone proposes the construction of a bulk water supply pipeline from the Oanob Dam near Rehoboth to the mine site. A 33 kV overhead powerline, to provide power to two required booster pump stations along a section of the pipeline, will be constructed in addition.

1.3.2 THIS EIA PROCESS

Prior to the commencement of the proposed construction of the pipeline and associated infrastructure, an environmental clearance is required from the DEA of the MEFT, based on an approved EIA process, report and EMP, in terms of the Environmental Management Act, No. 7 of 2007 and its associated regulations of 2012.

Namisun Environmental Projects and Development (Namisun) has been appointed by Lodestone as the independent Environmental Assessment Practitioner (EAP) to undertake this EIA process (see Chapter 2 for further details).

This EIA process includes a screening phase and a scoping phase (including impact assessment) and an EMP (see Figure 3). The assessment methodology is discussed in Chapter 2, which describes the phases of the assessment process in detail.

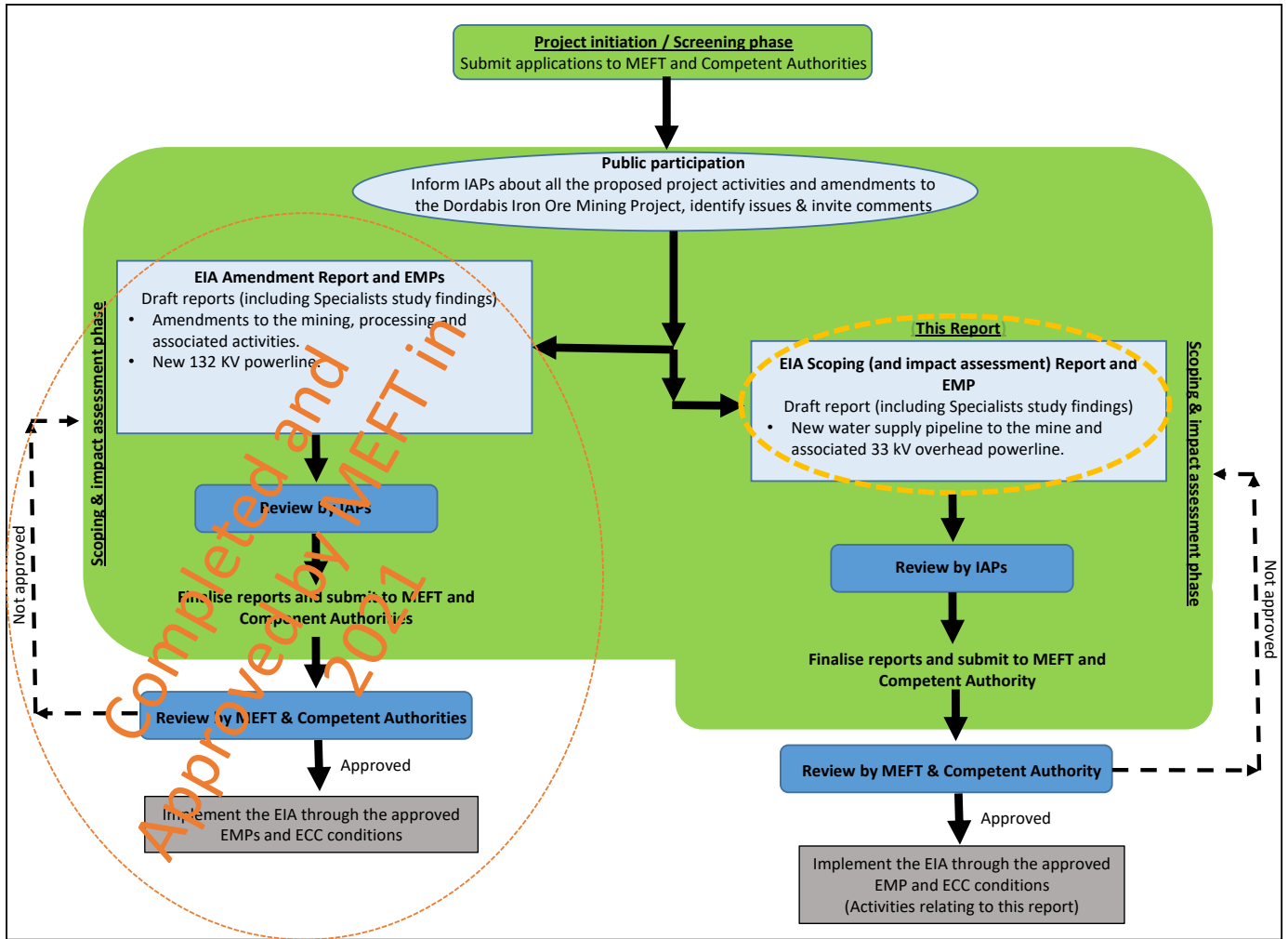


FIGURE 3: THE EIA PROCESS FOR THIS PROJECT

The EIA process has been registered on the EIA online portal of the MEFT (APP-001678). A final decision relating to the application will be made by the DEA of the MEFT.

Parallel application for an ECC was submitted to the competent authority, the MAWLR, who will review the application and relevant reports and submit their comments to the MEFT.

This report is the Scoping Report, with impact assessments included, and is accompanied by the EMP. Table 1 provides the structure for the content of this report.

TABLE 1: SCOPING REPORT CONTENT

CHAPTER	OBJECTIVE
Chapter 1: Introduction	This chapter describes the purpose of the report, briefly describes the background to the EIA process, summarizes legislative requirements, explains the report structure, summarizes assumptions and limitations of the study, and explains how the input from I&APs was included.
Chapter 2: Assessment methodology	Outlines the EIA process, including the I&AP consultation process.
Chapter 3: Legal framework	Provides an overview of relevant Namibian policies and applicable Namibian legislation
Chapter 4: Description of the proposed project	Describes the proposed bulk water supply pipeline and the associated 33kV powerline between the Oanob Dam and Lodestone's Dordabis Iron Ore Mine on ML 182.
Chapter 5: Alternatives	This chapter summarizes the project alternatives.
Chapter 6: Description of the current environment	Provides a general overview of the current baseline conditions relevant to the proposed new water pipeline and associated 33 kV powerline along a section of the pipeline.
Chapter 7: Identification and description of potential impacts	Outlines the environmental aspects and potential impacts related to the construction and operations of the proposed new water pipeline and associated 33 kV powerline along a section of the pipeline.
Chapter 8: Impact Assessment	Assesses the key potential impacts (as identified in Chapter 7).
Chapter 9: Conclusion and Recommendations	EIA conclusion and impact statement.
References	Reference list.
Appendices	Appendices to the report

Information contained in previous EIAs was used in this report and have been further augmented by site visits by the EIA team, as well as additional specialist studies and input from comments gathered because of stakeholder consultations. The potential impacts relating to the proposed activities and infrastructure associated with the proposed new water pipeline and powerline could therefore be assessed and the assessment findings are included in this report.

The overall objectives of the assessment process are to:

- Provide information on the proposed activities, i.e. the construction and operations of the bulk water supply pipeline and associated infrastructure, including the proposed 33 kV above-ground powerline, which runs parallel to a section of the pipeline to provide power to the booster pump stations.
- Describe the current environment in which the bulk water supply pipeline and associated infrastructure will be situated.
- Identify, in consultation with I&APs, the potential negative and positive environmental (and social) aspects.
- Assess the potential impacts of the proposed activities and infrastructure associated with the proposed new bulk water pipeline and powerline.
- Develop a specific “Water Supply Pipeline and Associated Infrastructure EMP”, taking overall commitments in the Lodestone Mine Amended EMP (Namisun, 2021) into consideration.

It is thought that this Scoping Report (including impact assessment) and accompanying EMP will provide sufficient information for the DEA to make an informed decision regarding the proposed activities, and whether an ECC can be issued or not.

1.4 ASSUMPTIONS AND LIMITATIONS

Assumptions, uncertainties, and limitations are presented in the specialist studies (Appendices G to J), where relevant, and will not be repeated in this report. Some general assumptions are described below.

1.4.1 THE AREA OF ASSESSMENT

For the invertebrate specialist study, the area of assessment is assumed as land located within 1 km distance of the proposed route of the water pipeline (Agri-ecological Services, 2021). The vegetation specialist focused on the impacts within a 20 m wide strip of land along the entire route of the pipeline, as it was assumed that all vegetation within this zone will be affected (Curtis Consulting, 2021). The archaeological specialist study focused on the proposed pipeline route as being confined to the road corridor and immediate adjacent land without locating other potential archaeological / heritage sites further away (Kinahan, 2021). For the avifauna specialist study, the area of assessment was the biggest – comprising the wider landscape southeast of Windhoek in central Namibia and covering five quarter-degree squares with available bird atlas data including powerline incidents recorded within a 100 km radius. Accordingly, the study area for

avifauna lies mainly within the Tree and Shrub Savanna Biome and the vegetation type is classed as Highland Shrubland verging into Southern Kalahari (African Conservation Services, 2020).

1.4.2 TECHNICAL INFORMATION SHARED BY LODESTONE

It is assumed that the technical (project) information provided by Lodestone is accurate. Furthermore, it is assumed that the baseline descriptions and assessments conducted as part of the original EIAs are accurate.

1.4.3 ENVIRONMENTAL ASSESSMENT LIMIT

The following activities and associated potential impacts are excluded from this application / assessment (i.e. this report):


- Agreed water supply from the Oanob Dam (i.e. a contracted abstraction yield of water). It is assumed that an abstraction agreement and related affairs will be reached between Lodestone and NamWater. Possible impacts associated with the proposed abstraction are not covered in the scope of this report and associated ECC application.
- The EIA focused on third parties only and did not assess health and safety impacts on workers because it is assumed that these aspects are separately regulated by health and safety legislation, policies and standards, and that Lodestone will adhere to these.

1.4.4 CONSULTATION WITH RELEVANT LANDOWNERS

The relevant landowners along the proposed pipeline route (e.g., owners of land and farms where the proposed new water pipeline and associated infrastructure will be situated) were consulted. Namisun engaged with numerous I&APs to obtain the correct contact details of these relevant landowners. Namisun furthermore travelled the entire (proposed) pipeline route and tried to visit all the relevant landowners (see Section 2.2 for further details).

1.5 OPPORTUNITY TO COMMENT

I&APs had been invited to comment on this Scoping Report (including impact assessment) and EMP, which were available for a review and comment period from **18 August to 18 September 2023**. Comments must have been sent to Namisun at the telephone number, or email address by **no later than 18 September 2023**.

	Namisun
	Attention: Werner Petrick
	E-mail address: wpetrick@namisun.com
	Cell number: +264 (0)81 739 4591

2 ASSESSMENT METHODOLOGY

This chapter outlines the EIA process and methodology applied, including the I&AP consultation process, in accordance with the requirements outlined in the EIA Regulations of 2012.

2.1 PROCESS AND METHODOLOGY

2.1.1 PROJECT INITIATION AND SCREENING PHASE

- Notify MEFT through the submission of the EIA application form and registration via the online portal of the MEFT (APP-001678).
- Project initiation meetings and site visits with the Lodestone technical team to discuss the proposed changes.
- Early identification of environmental aspects and potential impacts associated with the construction and operations of the proposed new water pipeline and associated 33 kV powerline along a section of the pipeline and determine additional legal requirements.
- Confirm specialists' terms of reference for further studies to assess potential impacts due to the proposed activities.
- Identify key stakeholders relating to the proposed new water pipeline and associated 33 kV powerline along a section of the pipeline.

2.1.2 SCOPING (INCLUDING ASSESSMENT) PHASE

- Notify other regulatory authorities and I&APs of the proposed new bulk water pipeline and associated infrastructure (via newspaper advertisements, this document, emails, site notices and telephone calls).
- Obtain initial comments from I&APs.
- Carry out specialist investigations.
- Assess the potential impacts of the proposed activities (and infrastructure) and compile an EIA Scoping (including impact assessment) Report (this report) and EMP.
- Distribute the Drafted Scoping Report and EMP for review and comment by I&APs.
- Update and finalize the documents with due consideration of comments received.
- Submit the final reports to the MAWLR (the competent authority) and MEFT for decision making.

2.1.3 DOCUMENTING THE REPORT

The main purpose of this report is to describe and indicate which environmental aspects relating to the construction and operations of the proposed new bulk water pipeline and associated infrastructure (the 33 kV powerline and two booster pump stations) along a section of the pipeline

might have impacts on the environment. These potential impacts were assessed, and the findings are presented in this report (refer to Chapters 7 and 8).

Table 2 outlines the Scoping Report requirements as set out in Section 8 of the EIA Regulations that were promulgated in January 2012 in terms of the Environmental Management Act, 7 of 2007.

TABLE 2: SCOPING REPORT REQUIREMENTS STIPULATED IN THE EIA REGULATIONS

REQUIREMENTS FOR A SCOPING REPORT IN TERMS OF THE FEBRUARY 2012 REGULATIONS	REFERENCE IN REPORT
(a) Details of the Environmental Assessment Practitioner (EAP) who prepared the report	Section 2.1.5 and Appendix A
(b) A description of the proposed activity	Chapter 4
(c) A description of the environment that may be affected by the activity and the way the physical, biological, social, economic, and cultural aspects of the environment may be affected by the proposed activity	Chapter 4, 6 and 7
(d) A description of the need and desirability of the proposed listed activity and identified potential alternatives to the proposed listed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity	Section 1.2, Chapter 5, 7 and 8
(e) An identification of laws and guidelines that have been considered in the preparation of the Scoping Report	Chapter 3
(f) Details of the public consultation process conducted in terms of Regulation 7(1) in connection with the application, including: <ul style="list-style-type: none"> (i) steps that were taken to notify potentially interested and affected parties of the proposed application (ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed or given (iii) a list of all persons, organisations and organs of state that were registered in terms of Regulation 22 as interested and affected parties in relation to the application (iv) a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues 	Sections 2.2, Appendices B - D
(g) An indication of the methodology used in determining the significance of potential effects / a description and assessment of the significance of effects, including cumulative effects, that may occur as a result of the undertaking of the activity or identified alternatives or as a result of any construction, erection or decommissioning associated with the undertaking of the proposed listed activity	Chapter 2, 5, 7 and 8
(h) A description and comparative assessment of all alternatives identified during the assessment process	Chapter 5

REQUIREMENTS FOR A SCOPING REPORT IN TERMS OF THE FEBRUARY 2012 REGULATIONS	REFERENCE IN REPORT
(i) A description of all environmental issues that were identified during the assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures	Chapter 7 and 8, Appendices E - H
(j) An assessment of each identified potentially significant effect	
(k) A description of any assumptions, uncertainties and gaps in knowledge	Section 1.4
(l) A management plan	Accompanies the main report as a separate document
(m) An opinion as to whether the proposed listed activity must or may not be authorised, and if the opinion is that it must be authorised, any conditions that must be made in respect of that authorisation	Chapter 9
(n) A non-technical summary of the information	Executive Summary

2.1.4 INFORMATION COLLECTION

Namisun obtained information from various sources to identify the environmental aspects relating to the construction and operations of the proposed new bulk water pipeline and its associated infrastructure and to assist in the assessment of potential impacts. Information was sourced from:

- The original / approved EIA Report (Colin Christian & Associates CC, 2013) and the supporting documents submitted as part of the renewal application in 2019.
- EIA Amendment Report and EMP for the proposed changes to the “Dordabis Iron Ore Mining Project and Associated Infrastructure” and a proposed new 132 kV powerline to the mine (Namisun, 2020).
- Technical information relating to the proposed new infrastructure and activities, provided by the management team of Lodestone.
- Consultations with:
 - The management team, technical advisors and engineers of Lodestone.
 - NamWater.
 - Relevant regulatory authorities.
 - I&APs (specifically the relevant landowners – where possible).
- Specialist investigations to assess impacts, including:
 - A vegetation survey and assessment by Curtis Consulting (Barbara Curtis) – see Appendix E.

- A survey and assessment of reptiles, birds and mammals by Agri-ecological Services (Cornelius van der Waal) – see Appendix F.
 - An archaeological survey and assessment by J Kinahan Archaeologist (Dr John Kinahan) – see Appendix G.
 - A bird survey and assessment relating to the powerline by African Conservation Services (Dr Ann and Mike Scott) – see Appendix H.
- Site visits by Namisun.
 - Google Earth.
 - Atlas of Namibia (Mendelsohn et al., 2002).
 - The roadside geology of Namibia (Schneider, 2004).
 - Bush encroachment in Namibia (De Klerk, 2004).

2.1.5 EIA TEAM

Lodestone appointed Namisun (a Namibia-based company) to undertake and manage the EIA process and environmental clearance applications.

Werner Petrick, the EIA project manager has more than twenty-four years of relevant experience in environmental management, conducting / managing EIAs, compiling EMPs and implementing EMPs and Environmental Management Systems (EMSs). Werner is certified as a Lead Environmental Practitioner and Reviewer under the Environmental Assessment Professional Association of Namibia (EAPAN).

Dr Pierré Smit, the EIA project coordinator holds a PhD in Landscape Ecology and has more than twenty-eight years of experience in environmental management, managing environmental assessment and the implementation of EMPs and EMSs in Namibia.

The Environmental Project Team for the EIA process is outlined in Table 3.

The relevant curriculum vitae documentation is attached in Appendix A.

TABLE 3: EIA PROJECT TEAM

TEAM	NAME	DESIGNATION	TASKS AND ROLES	COMPANY
Project Proponent	Daniel Castelyn	Chief Operating Officer	Responsible for the interface between Lodestone and the environmental team, and for ensuring implementation of the EIA outcomes.	Lodestone
EIA Project Management Team	Werner Petrick	Environmental Assessment Practitioner	Management of the process, team members and other stakeholders. Report compilation and process review.	Namisun
	Pierré Smit		Reporting	
	Maureen Fiddler	Administrative assistance	Project administration, assist Public Participation Process	
Further specialist investigations incorporated into this report				
Vegetation	Barbara Curtis	Botanist	Vegetation survey and assessment	Curtis Consulting
Reptiles, birds and mammals	Cornelius van der Waal	Ecologist	Reptiles, bird and animals survey and assessment	Agri-ecological Services
Archaeology	John Kinahan	Archaeologist	Archaeological survey and assessment	J Kinahan Archaeologist
Avifauna	Mike and Ann Scott	Bird Specialists	Avifauna assessment	African Conservation Services CC

2.2 PUBLIC PARTICIPATION PROCESS

The public participation process for the proposed project was conducted to ensure that all persons and or organisations that may be affected by, or interested in, the proposed activities and infrastructure, were informed of the project and could register their views and concerns. By consulting with relevant authorities and I&APs, the range of environmental issues to be considered in this Scoping Report (including impact assessment) has been given specific context and focus.

Section 2.2.1 provides a summary of I&APs consulted, the process that was followed, and the issues that were identified.

2.2.1 INTERESTED AND AFFECTED PARTIES

Table 4 contains a broad list of persons, group of persons or organisations that were informed via phone calls and SMS messages, advertisements, site notices and email notifications about the overall amendments to the Dordabis Iron Mine and Associated Activities and specifically the proposed bulk water pipeline and its associated infrastructure to register as I&APs should they be interested and or affected.

TABLE 4: LODESTONE STAKEHOLDERS

I&AP GROUPING	ORGANIZATION
Local and regional authorities – councillors and key officers	MEFT; MAWLR; Khomas Regional Council, City of Windhoek (COW); National Heritage Council of Namibia.
Parastatals	NamWater; NamPower; Roads Authority
Environmental organizations and NGOs	Southern Africa Institute for Environmental Assessment; Earthlife Namibia; Namibia Chamber of Environment; Namibia Nature Foundation; World Wildlife Fund in Namibia; Namibia Agricultural Union; Namibian Development Corporation
National chambers	Chamber of Mines of Namibia; National Chamber of Commerce and Industry; and National Chamber of Environment.
Local businesses	Various in Windhoek and Rehoboth
Residents and farmers	Various landowners of farmlands
Media	Newspaper adverts: <i>The Namibian Sun</i> , <i>Die Republikein</i> ; <i>Allgemeine Zeitung</i>
Other I&APs	Any other people with an interest in the proposed project or who may be affected by the proposed project.

An updated stakeholder database contains the details of the I&APs relevant to the proposed new water pipeline and associated infrastructure, attached to this report under Appendix B. Several changes in terms of land ownership and changes in contact details since 2020 were necessary.

2.2.2 STEPS IN THE PUBLIC CONSULTATION PROCESS

With reference to Section 2.2.1, public consultation activities commenced in 2020 during the EIA (amendment) process, entailing the following two applications:

- Amendment to the Dordabis Mine and Associated Activities. This application was approved by MEFT in 2021, following the submission of the EIA (Amendment) Report and Amended EMP.
- A proposed new 132 kV overhead power supply line from the Auas substation to the mine. This application was approved by MEFT in 2021, following the submission of the EIA report and a powerline specific EMP.

Simultaneously, Lodestone proposed the construction of a bulk water supply pipeline from the Oanob Dam near Rehoboth to the mine site, to secure a stable water supply to the mine. A 33 kV overhead powerline, to provide power to two required booster pump stations along a section of the pipeline, forms part of this proposed project and Namisun initiated this EIA application process in parallel with the two above-mentioned applications. However, the proposed pipeline's EIA process was delayed and could only be completed in 2023. As a result of this delayed assessment process, it was felt necessary for Lodestone to issue an update on the entire Lodestone Namibia Iron Ore Project to all "Lodestone I&APs" during October 2023 to provide clarity on its various components and the associated assessment processes (see attachments under Appendix C). The matter of a bulk water supply agreement between Lodestone and NamWater was also re-addressed in October 2023 (see also Sections 1.2, 2.2.2.2 and the minutes of the meeting attached under Appendix C).

Figure 3 illustrates diagrammatically the relationship between the 2020 EIA (amendment) process and the EIA (scoping and including an impact assessment) process for the proposed bulk water pipeline and its associated infrastructure. The sections below describe the initial (overarching Project) EIA public participation process (Section 2.2.2.1) and the 'pipeline specific' EIA public participation (Section 2.2.2.2).

2.2.2.1 Consultation process as part of the EIA Amendment Application (2020)

In this section the public consultation process during the 2020 EIA (amendment) application is summarized. The full public consultation process is comprehensively described in Chapter 2 of the EIA (Amendment) Report and Amended EMP for Lodestone (Namisun, 2020).

Notification to the authorities (May – June 2020)

- Namisun notified the DEA of the MEFT of the proposed project through registering the project on their online portal and uploading the BID.

Identification of I&APs (May 2020 and ongoing during the assessment process of 2020)

- An extensive database of stakeholders was compiled, utilizing the information contained in the original Dordabis Iron Ore Mining Project EIA from 2012 and updated input from Lodestone. This database was updated as and when required during the 2020 assessment process and is attached as Appendix B of the EIA (Amendment) Report and Amended EMP for Lodestone (Namisun, 2020).

Distribution of the BID (July 2020)

- Copies of the BID were distributed via email to the relevant authorities and I&APs on the full stakeholder database and hard copies were made available on request.

- Namisun contacted (telephonically) various key stakeholders to confirm their email addresses for sharing the BID, to arrange for Focus Group meetings, and to add and update information contained in the I&AP database.
- The purpose of the BID was to inform I&APs and authorities about the proposed project, the assessment process being followed, possible environmental impacts and ways in which I&APs could provide input to Namisun. Attached to the BID was a registration and response form, which provided I&APs with an opportunity to submit their names, contact details and comments on the project.
- A copy of the BID is attached in Appendix C of the EIA (Amendment) Report and Amended EMP for Lodestone (Namisun, 2020).

Site notices and email communication (July 2020)

- Emails were sent to all I&APs on the database and site notices were placed to notify I&APs of the proposed project, the EIA process being followed and who to contact for further information requirements. The site notices were placed at the following locations:
 - Near the Hoffnung rail siding
 - Near the entrance of the Finkenstein Estate
 - At the entrance to the site of the Dordabis Iron Ore Mine
 - At the Dordabis Clinic
 - At the Shoprite Shopping Complex in Rehoboth
- Photos of the displayed site notices are attached in Appendix D of the EIA (Amendment) Report and Amended EMP for Lodestone (Namisun, 2020).

Newspaper advertisements (July 2020)

- Block advertisements were placed in the Market Watch as part of the following newspapers:
 - *The Namibian Sun* (24 and 31 July 2020)
 - *Die Republikein* (24 and 31 July 2020)
 - *Allgemeine Zeitung* (24 and 31 July 2020)
- Copies of the advertisements are attached in Appendix C of the EIA (Amendment) Report and Amended EMP for Lodestone (Namisun, 2020).

Focus group meetings and key stakeholder engagements (July - September 2020)

- Several focus group meetings were held via Zoom calls:

- With Finkenstein-based stakeholders
- With individual farmers: Mr Biederlack, Mr Kotze
- With an officer of the Ministry of Works and Transport: Mr Kahlomo
- Several face-to-face focus group meetings took place:
 - With NamWater
 - With the Dordabis farmers (on the mine site, and in Dordabis)
- Several telephonic discussions were held:
 - With Mr Nicky Tobias on behalf of Messrs Reinholdt Otto, Stefanus Cloete and Immanuel Karukao
 - With various surrounding farm owners and other I&APs.
- Namisun travelled the proposed pipeline route and where possible visited the relevant landowners (including the farms along the pipeline route).
 - During these visits Namisun presented the BID and explained the proposed project amendments (including the proposed bulk water pipeline and its associated infrastructure).
- The stakeholder database (Appendix B) was updated, as new and corrected information about the farm owners was obtained.
- Minutes of the meetings were attached in Appendix F of the EIA (Amendment) Report and Amended EMP for Lodestone (Namisun, 2020).
- The PowerPoint presentation to share information about the proposed project amendments during the meetings was attached as Appendix G of the same report.

Comments and responses (July – August 2020)

- The bulk of the issues and comments raised during the initial public participation process relate to the aspects and impacts of the mine.
- However, the following issues that were raised relate more specifically to the water supply of the mine:
 - The bulk of the comments raised by I&APs related to concerns about the water abstraction from the Oanob Dam, the permission thereof and the potential impacts thereof. This includes concerns about the sustainability of the abstraction yields and the effects thereof on the development and future of Rehoboth, effects on the plot owners along the dam and effects on the downstream ecology (e.g. the Acacia

forest). Permissions to abstract water from the Oanob Dam were questioned and questions about alternative water supply options for Lodestone were also asked. Furthermore, questions were asked how the monitoring of abstraction through the pipeline will be done and how compliance (in terms of abstraction) will be assured.

- In addition, a few questions were asked about the design and civil works of the proposed pipeline: Will the pipeline and powerline run next to each other? What is the size of the pipeline? What is the reasoning behind the ground level reservoir(s)? What is the exact routing of the pipeline?
- Questions were also raised about the possibility of offtake from the pipeline.

Therefore, the bulk of the comments previously raised by I&APs focused on the abstraction of water from the Oanob Dam, the permission thereof and the potential impacts. With reference to Section 1.4.3, the activities and associated potential impacts relating to the water supply from the Oanob Dam (i.e. abstraction) are excluded from this assessment and report and will be addressed through the relevant agreements between Lodestone and NamWater and the implied permits / authorizations.

Review of the draft EIA (Amendment) Report and Amended EMP by I&APs (November 2020)

- A hard copy and electronic (soft) copy of the draft report (including all appendices) were made available for review at the Windhoek Public Library and the Dordabis Store ('Winkel') from 6 November 2020 to 30 November 2020.
- Electronic copies of the Executive Summary Report were distributed to all register I&APs via e-mail. Electronic copies of the full report were available on request to Namisun.
- I&APs had the opportunity to review the draft report and submit comments in writing to Namisun. The closing date for comments was 20 November 2020.
- Telephonic / Zoom call discussions were held with some I&APs during the review period on request, as follows:
 - Mr. Zandr  Duvenhage (Fisher, Quarmby & Pfeifer Attorneys – representing the Dordabis Farmers Association) to explain the EIA process conducted and the findings of the study.
 - Ms Christa Hansen (Stinkwater Community - Chairperson of the Community Development Committee) to explain the study findings and to obtain further input / comments.
- These comments were captured in Appendices H and I of the EIA (Amendment) Report and Amended EMP for Lodestone (Namisun, 2020).

Review of the finalized EIA (Amendment) Report and Amended EMP by the authorities for decision making (December 2020).

- Namisun (and the appointed environmental specialists) considered all the comments from I&APs and the regulatory authorities after the closing date for comments. Where relevant, the reports were updated. A copy of the final report, including review comments from the I&APs, was delivered to MME and MEFT for their review and decision making.

2.2.2.2 Consultation process as part of the completion of the EIA for the proposed bulk water pipeline and associated infrastructure (2023)

Although the EIA process for the proposed bulk water pipeline and its associated infrastructure commenced in parallel with the EIA (amendment) process in 2020, completion of the pipeline assessment was interrupted by the COVID Pandemic and several other restrictive factors. As a result, the assessment and associated public consultation process recommenced in all earnest during 2023.

Several requirements for the public consultation process (see Table 2 and Section 2.2.2.1) have been addressed during the EIA (amendment) process of 2020 already; therefore, the focus for the public consultation process in 2023 shifted to an emphasis on the landowners along the proposed pipeline route (only).

Notification to the authorities

- The DEA of the MEFT has been notified of the proposed project through registering the project on their online portal and uploading the BID in May 2020.

Identification of I&APs

- For the EIA (amendment) process of 2020, a comprehensive database of stakeholders was compiled. From this original database the I&APs specifically relevant to the proposed pipeline (only) were selected and the retrieved information was updated as several changes in terms of land ownership and contact details since 2020 were necessary.
- As part of the efforts to update the stakeholder database, an updated farm map was created. As far as possible Namisun contacted (telephonically) the owners of the farms along the proposed route to confirm their email addresses for sharing information about the project, the assessment process being followed, possible environmental impacts and ways in which I&APs could provide input to Namisun.
- Electronic copies of the database were sent on email to each of the identified I&APs with email access. Hard copies were delivered by hand to those I&APs without email access during informal discussions on their farms, where possible.

- The “new” stakeholder database was continuously updated since July 2023 and is attached to this report under Appendix B.

Distribution of the BID

- A copy of the BID that was distributed in 2020 – under Appendix C of the approved EIA (Amendment) Report and Amended EMP for Lodestone (Namisun, 2020) – is attached to this report under Appendix C.

Site notices

- The site notices were placed at five locations in 2020. Photos of the displayed site notices were attached in Appendix D of the EIA (Amendment) Report and Amended EMP for Lodestone (Namisun, 2020). and is attached to this report under Appendix C.

Newspaper advertisements

- The advertisements for the proposed project were placed in the newspapers in 2020. Copies of the advertisements were attached in Appendix C of the EIA (Amendment) Report and Amended EMP for Lodestone (Namisun, 2020). and is attached to this report in Appendix C.

Engagement with key stakeholders

- As part of the update of the stakeholder database (see also text above), several telephonic discussions were held with most of the landowners along the proposed route. In most cases these telephone discussions were followed with emails to confirm the contact details of the identified stakeholders by means of an updated farm map and an updated list of farms and farm owners.
- Details on the stakeholder database became increasingly accurate, as a result.
- A copy of the interactions with stakeholders against their names on the database and copies of the email communications with specific stakeholders are attached in Appendix C of this report.

Review of the draft Scoping (including impact assessment) Report and EMP by I&APs

- An electronic (soft) copy of the draft documents was distributed via e-mail to all I&APs on the updated stakeholder database for review from 18 August to 18 September 2023.
- Electronic copies of the full report were available on request to Namisun.
- Hard (printed) copies of the Executive Summary Report were made available to I&APs without emails, i.e. hand delivered during the farm visits.

- Namisun travelled the proposed pipeline route during August 2023. Where possible all relevant landowners (including the Rehoboth Town Council and the farms along the pipeline route) were visited and informal meetings were held.
 - During these visits Namisun further verified the contact details of the various landowners and where necessary delivered a hard copy of the executive summary of the report to stakeholders who did not receive the electronic copy of the draft report and EMP.
 - Details on the stakeholder database became even more accurate, as a result.
- An informal, face-to-face meeting was held with NamWater in Windhoek, during which a hard copy of the executive summary of the report was delivered – in addition to the electronic copy of the draft documents.
- In the absence of an agreement on the bulk water supply between NamWater and Lodestone it was necessary to re-address this matter during a (virtual) meeting between NamWater, the MAWLR (the Department of Water Affairs), Lodestone and Namisun in October 2023. The minutes of this meeting are attached to this report (see Appendix C).
- I&APs had the opportunity to review the draft documents and submit comments in writing to Namisun. The closing date for comments was 18 September 2023.

In addition to the above, (as described in Section 2.2.2) Lodestone issued an update on their Iron Ore Project to all “Lodestone I&APs” during October 2023 to provide clarity on its various components and the associated assessment processes. Lodestone therefore sent out an email to all I&APs on the “overall project database” to provide relevant information, including the current EIA Application process for the pipeline being finalised. Other interested parties therefore also had the opportunity to raise any further possible queries or provide comments (see attachment under Appendix C).

Comments and responses

- The issues raised during the telephonic discussions, informal meetings and email communications entail the following (specifically to the pipeline):
 - Details about the design and civil works of the proposed project: What is the size of the pipeline? What is the exact routing and positioning of the pipeline?
 - Can water offtake be arranged for farmers along the route?
 - How will permissions related to the access and servitude be arranged? How will the implications in terms of farm tax be addressed?
 - What are the possibilities to be connected to the proposed powerline?

- What kind of work opportunities will be created during the construction of the pipeline and its associated infrastructure?
- An Issues and Response Report (IRR) is attached in Appendix D of this report.

Review of the finalized EIA (Amendment) Report and Amended EMP by the authorities for decision making.

- Namisun (and the appointed environmental specialists) considered all the comments from I&APs after the closing date for comments. Where relevant, the reports were updated. Copies of the final documents, including review comments from the I&APs, were delivered to the MAWLR and MEFT for their review and decision making.

2.2.3 COMBINED SUMMARY OF THE COMMENTS AND ISSUES RAISED

The section below provides a summary of the key issues raised by I&APs to date.

To make the list of comments and issues comprehensive, the relevant comments and responses obtained during 2020 (see also Section 2.2.2.1) were considered, together with the issues raised between July and September 2023 (see Section 2.2.2.2).

It must be noted that issues related to water abstraction activities were not part of this assessment (see Section 1.4.3). However, for comprehensiveness these issues are included in the IRR of this report (Appendix D), which points out that these issues will be addressed through the relevant agreements between Lodestone and NamWater and the implied permits / authorisations.

Subsequently, the main issues raised (related specifically to the pipeline) and responded to in the IRR (see Appendix D) can be summarized as follows:

- Will the pipeline and powerline run next to each other? What is the exact routing and positioning of the pipeline?
- What is the size of the pipeline?
- What is the reasoning behind the ground level reservoir(s)?
- Can water offtake be arranged for farmers along the route?
- How will permissions related to the access and servitude be arranged?
- What are the possibilities to be connected to the proposed powerline?
- How many job opportunities will be created during the construction of the pipeline and its associated infrastructure?

3 LEGAL FRAMEWORK

This chapter provides an overview of relevant Namibian policies and applicable Namibian legislation and international conventions / treaties applicable to the proposed project.

The Republic of Namibia has five tiers of law and a few guiding policies relevant to environmental assessment and protection, which include the Constitution of the Republic of Namibia, statutory law, common law, customary law and international law.

As the main source of legislation, the Constitution of the Republic of Namibia (1990) makes provision for the creation and enforcement of applicable legislation. Article 95 (1) of the Constitution says: *“The State is obliged to ensure maintenance of ecosystems, essential ecological processes and biological diversity and utilisation of living natural resources on a sustainable basis for the benefit of Namibians both present and future”*.

In this context and in accordance with the constitution, Namibia has passed numerous laws intended to protect the natural environment and mitigate against adverse environmental impacts.

3.1 RELEVANT ACTS

The acts of relevance to this project are summarized in Table 5.

TABLE 5: RELEVANT LEGISLATION FOR THE PROPOSED WATER PIPELINE AND ASSOCIATED 33 KV POWERLINE

YEAR	NAME	Natural Resource Use (energy & water)	Emissions to air (fumes & dust)	Emissions to land (non-hazardous & hazardous)	Emissions to water	Noise	Visual	Traffic	Impact on Land use	Impact on biodiversity	Impact on Archaeology	Socio-economic	3 rd Party Safety & Health	Other
1956	Water Act, No 54 of 1956, as amended	X										X		
1969	National Monuments Act, No 28 of 1969										X			
1969	Soil Conservation Act, No.76 of 1969 and the Soil Conservation Amendment Act, No 38 of 1971	X			X				X					
1974	Hazardous Substance Ordinance, No 14 of 1974													X
1975	Nature Conservation Ordinance, No 14 of 1975 (as amended)	X			X					X	X			
1976	Atmospheric Pollution Prevention Ordinance No 11 of 1976		X											
1990	The Constitution of the Republic of Namibia of 1990	X	X	X	X	X	X	X	X	X	X	X	X	
1990	Petroleum Products and Energy Act, No 13 of 1990		X	X	X					X			X	X
1990	Nature Conservation General Amendment Act of 1990	X			X					X	X			
1996	Nature Conservation Amendment Act, No 5 of 1996	X			X					X	X			
1997	Namibian Water Corporation Act, No 12 of 1997	X												
1999	Road Traffic and Transport Act, No 22 of 1999							X						

YEAR	NAME	Natural Resource Use (energy & water)	Emissions to air (fumes & dust)	Emissions to land (non-hazardous & hazardous)	Emissions to water	Noise	Visual	Traffic	Impact on Land use	Impact on biodiversity	Impact on Archaeology	Socio-economic	3 rd Party Safety & Health	Other
2001	Road Traffic and Transport Regulations, Government Notice No. 53 of 2001		X	X	X			X					X	
2001	The Forestry Act, No 12 of 2001 as amended by the Forest Amendment Act, No 13 of 2005 and its regulations of 2015	X							X	X				
2003	Pollution Control and Waste Management Bill (3rd Draft September 2003)		X	X	X	X								
2004	National Heritage Act, No 27 of 2004										X		X	
2007	Labour Act, No 11 of 2007											X		
2007	Electricity Act, No 4 of 2007								X					
2007	Environmental Management Act, No 7 of 2007	X	X	X	X	X	X	X	X	X	X	X	X	
2012	Regulations promulgated in terms of the Environmental Management Act, No 7 of 2007	X	X	X	X	X	X	X	X	X	X	X	X	X
2013	Water Resources Management Act, No 11 of 2013	X			X							X		
2015	Public and Environmental Health Act, No 1 of 2015					X							X	
2017	Nature Conservation Amendment Act, No 3 of 2017	X			X					X	X			

3.2 SUMMARY OF APPLICABLE POLICIES AND PLANS

Some policies and plans currently in force are relevant to this assessment, in addition:

- Namibia's Environmental Assessment Policy for Sustainable Development and Environmental Conservation (1994).
- Policy for the Conservation of Biotic Diversity and Habitat Protection (1994).
- The EIA Policy (1995).
- National Environmental Health Policy (2000).
- Draft Wetland Policy (2003).
- The National Climate Change Policy of Namibia (September 2010).
- White Paper on the Energy Policy, 1998.
- National Waste Management Policy (2010)
- National Biodiversity Strategy and Action Plan (NBSAP) 1 (2002) and 2 (2014).
- National Agriculture Policy (2015)
- National Development Plan, 2017/2018 – 2021/2022, guided by Vision 2030.
- Namibia Vision 2030.

3.3 OTHER GUIDANCE AND REGULATORY FRAMEWORKS

Some international legislation, treaties, standards and guidelines – some to which Namibia is a signatory – are also of relevance, including the following:

- The Convention on Biological Diversity (CBD) of 1992 details the preservation of rare and endemic species and Article 14 of the convention requires that EIAs are carried out for projects that are likely to have an adverse effect on biodiversity.
- The Convention to Combat Desertification of 1992 advocates the prevention of excessive land degradation that may threaten livelihoods.
- The Convention on International Trade in Endangered Species (CITES) of 1973 regulates the trade in endangered species – specifically species threatened with global extinction and species that may become extinct unless trade in them is strictly regulated.

3.4 APPLICABLE LISTED ACTIVITIES

The EIA Policy (1995) is enforced through the Environmental Management Act, 7 of 2007 and the EIA Regulations of 6 January 2012 (EIA Regulations). In terms of this legal framework certain identified activities may not commence without an environmental clearance issued by MEFT.

The following activities identified in the regulations apply to Lodestone's proposed bulk water supply pipeline and associated powerline along a section of the pipeline:

ENERGY GENERATION, TRANSMISSION AND STORAGE ACTIVITIES

1. The construction of facilities for –
 - (b) the transmission and supply of electricity

INFRASTRUCTURE

- 10.1 The construction of –
 - (a) oil, water, gas and petrochemical and other bulk supply pipelines

4 DESCRIPTION OF THE PROPOSED PROJECT

This chapter describes the proposed bulk water supply pipeline between the Oanob Dam and the mine site and the associated 33 kV powerline along a section of the proposed pipeline.

4.1 GENERAL PROJECT INFORMATION

4.1.1 DETAILS OF THE APPLICANT

Company name:	Lodestone Namibia (Pty) Ltd
Contact (responsible) person:	Mr. Daniel Castelyn
Tel:	+264 61 218-079; +264 811447868
Email:	d.castelyn@lodestonepty.com

Lodestone Namibia (Pty) Ltd is a 100 % privately funded mining company.

4.1.2 OVERVIEW

In Chapter 1 of this report the background, location and history of the Dordabis Iron Ore Mining Project is described.

4.2 PROPOSED NEW BULK WATER SUPPLY PIPELINE AND ASSOCIATED 33 kV POWERLINE

4.2.1 BULK WATER SUPPLY PIPELINE

In the original approved EIA of 2013 (Colin Christian & Associates CC, 2013), the water demand and supply were described. Supply from the Oanob Dam near Rehoboth was proposed at 900,000 m³ per annum in 2013.

Recent water supply requirements were determined at 2.0 Mm³ per annum. It was independently assessed¹ that the potential water supply from the Oanob Dam would be sufficient for Lodestone's needs. Lodestone had consultations with NamWater in 2019, 2020 and 2021 and independent verification of the abstraction rates were presented during these sessions. Based hereupon, it is proposed that bulk raw water will be supplied by NamWater with a ~102 km-long pipeline, for mining, processing, and associated activities during operations of the full-scale project. The water supply will however be assessed finally by NamWater based on their conditions of supply and existing customers / end users. A formal agreement between Lodestone and NamWater still needs to be formulated.²

¹ Not part of this EIA process.

² With reference to Section 1.4, the water abstraction activities are not part of the scope of this assessment and report.

The offtake point for the proposed water pipeline will be from NamWater's raw water pipeline between the inlet tower and the water treatment plant below the Oanob Dam wall. The offtake will provide water to a 2,000 m³ ground level reservoir at the base pump station, to ensure a consistent flow from the base station into the pipeline. Two more booster pump stations are planned along the pipeline, each with a 500 m³ ground level reservoir for control purposes. The pump stations (i.e. pump houses) will be less than 5 m high and enclosed with security fencing.

In the absence of a formal agreement between NamWater and Lodestone, the technical details of the pipeline are not included in this assessment. The main pipeline design is for a buried polyvinyl chloride (PVC) pipeline with a diameter of 315 mm. From the base station at the Oanob Dam, the route of the pipeline will follow one of the two Oanob Dam access roads, across the B1, eastwards along the north side of the C25 to Rehoboth Station and follow the D1228 eastward to the D1249. Here the pipeline turns sharply northwards and run along the western side of D1249 to the C23, where it will turn westwards along the south side of the C23 for approximately 5 km to the mine site. The proposed pipeline route is presented in Figure 4. See also Figure 2.

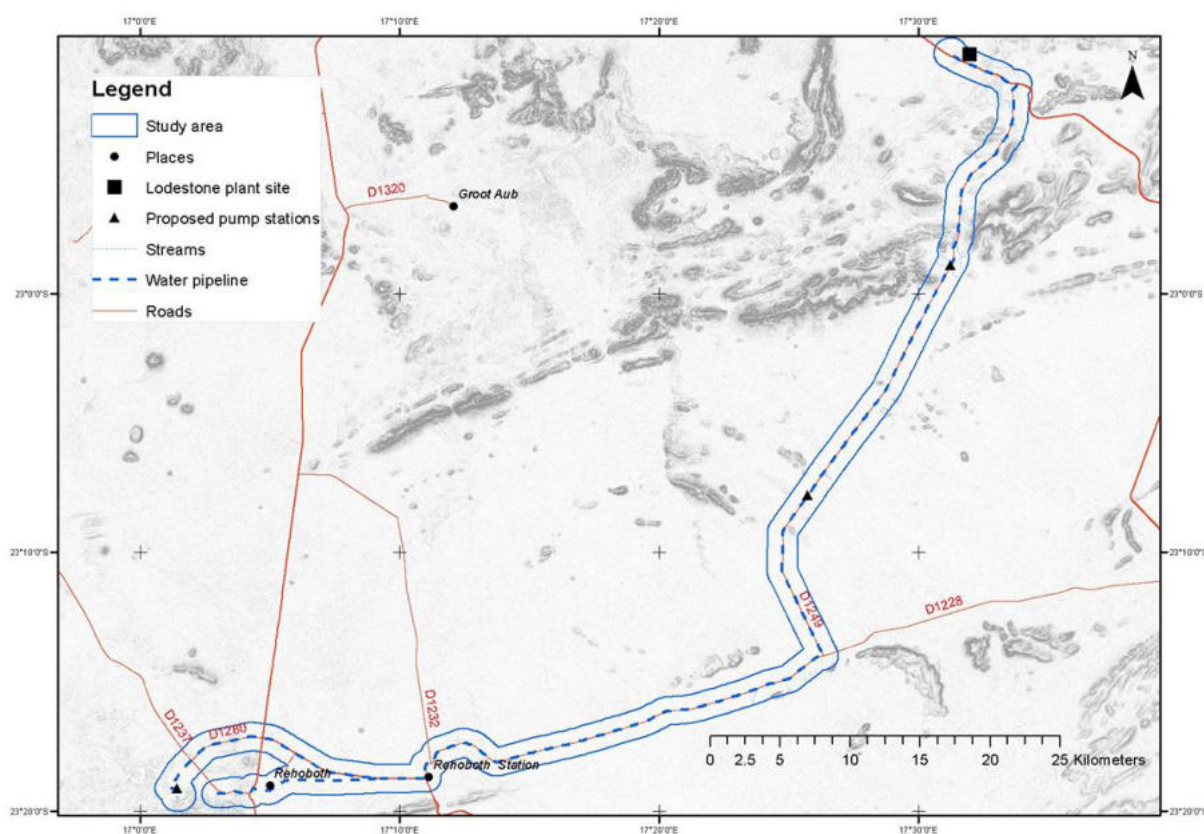


FIGURE 4: LOCATION AND ROUTE OF THE PROPOSED PIPELINE

An earth embankment with a smooth 1.5 mm high density polyethylene (HDPE) lining will act as a terminal water reservoir onsite, to where the water will be supplied by the pipeline.

Bedding and filling material for the buried pipeline will be obtained from the trenches and excavations, or otherwise from borrow pits on farms after approved agreements with the respective landowners.

4.2.1 THE ASSOCIATED 33 kV POWERLINE

A new dedicated 33 kV above-ground powerline will be installed to provide power to the booster pump stations along a section of the pipeline. This powerline will run from a connection with the existing 33 kV Seeis-Dordabis distribution line to the main (base) pump station via two booster pump stations, over 38 km along the D1249 gravel road, and adjacent to the proposed new water pipeline (see Figure 2).

The line configuration is a combination of wooden horizontal line post compact delta monopoles (known as the HLPCD structure) and A-frame strain structures (both 9.0 m high), with associated transformer and step-down structures. At road crossings the height of the poles will be higher, 11 m. Ground clearance at mid-span is 5.1 – 5.3 m high and the span length is 120 m, but 70 m before and after bends.

The A-frame strain structure is steel, mounted on a wooden pole (see Figure 5). It has two stay wires in-line and three stay wires for angle strains (where the line changes direction). This structure has three "jumpers", live wires that enable the continuity of the current between spans. It is also earthed, by means of a vertical cable mounted on the pole.

A typical transformer structure (used at the end of the powerline to step down the current) is shown in Figure 5, mounted on a steel A-frame structure. Note the live jumpers (also referred to as "droppers"), conveying the power from the conductors to the transformer.

The intermediate poles do not have stay wires. Three conductors are suspended, one above the other but offset (in delta configuration), each resting on an insulator. Each pole is earthed by means of a galvanised wire running vertically from the ground to the top of the pole.



FIGURE 5: PHOTOS OF SIMILAR STRUCTURES THAT WILL BE USED FOR THE PROPOSED POWERLINE

*ACS, 2020

4.2.2 SERVITUDE

A servitude will be cleared beneath the powerline.

Since no infrastructure is allowed within the road reserve of any Namibian public road, a 15 m wide servitude will be created on farmland 5 m outside the road reserve boundary and the same servitude will be used for the powerline.

The pipeline will pass through 16 privately owned farms, as well as the Rehoboth Townlands (see Figure 2).

4.3 CONSTRUCTION PHASE

4.3.1 CONSTRUCTION ACTIVITIES

Construction activities will take place during the preparation and establishment phases of the water pipeline, the pump stations, and the associated powerline along a section of the pipeline.

The following activities are expected:

- Surveying and setting out of the final pipeline / powerline route.
- Clearing the servitude (from large trees, shrubs, bushes, etc.).
- Pegging of the pipeline and powerline.
- Trenching and excavations for the pipeline.
- Drilling of holes by means of a compressor drill rig for the poles of the powerline.
- Drilling and blasting, where required.
- Cleaning, grubbing and bulldozing.
- General earthworks, including levelling and piling of soil.
- Excavations for foundations.
- Planting of poles for the powerline, using a 4x4 truck.
- Storage and handling of material (sand, rock, cement, chemical additives) in work areas.
- Water utilization.
- Operation and movement of construction vehicles.
- Refuelling of equipment.
- Handling, storage, and transportation of non-hazardous and hazardous waste.
- Disposal or treatment of contaminated soil.

All the components for the water pipeline and powerline construction (PVC pipe, steel pylons, conductors, and insulators, etc.) will be transported to site by road on low-bed trailers. No

significant impacts associated with traffic interruption are expected on these roads due to the construction activities.

Concrete will be mixed and poured onsite; subsequently all concrete constituents (crushed stone, cement, water, and sand) will have to be transported to site.

4.3.2 EMPLOYMENT AND ACCOMMODATION

At least two teams will conduct work on this project, starting from opposite ends to the middle. Not more than 40 people per team is expected.

Typically, temporary construction camps accommodating the workforce will be located close to the work area. These sites will have to be negotiated with the applicable farm owners.

4.3.3 ACCESS ROADS

Existing access routes and roads will be used, as far as possible.

As the pipeline will run along the reserves of existing roads, the main access to the pipeline will be from the reserves of the existing roads, i.e. the B1, the C25, the D1228, the D1249 and the C23 roads. In liaison with landowners, access will be arranged where necessary and local tracks will be used. Access points should be through existing farm gates, where possible.

By taking the shortest route, the impacts of the pipeline are minimized. In the same view, access routes will be limited to a minimum distance. During construction the movements of large vehicles will be confined to the servitude.

4.3.4 HAZARDOUS SUBSTANCES

The table below describes the possible hazardous substances that will be handled.

TABLE 6: HAZARDOUS SUBSTANCES THAT WILL BE UTILISED

SUBSTANCE	PURPOSE	STORAGE
Diesel fuel	Fuel for vehicles and generators.	Existing fuel station(s) in Rehoboth and Windhoek. No storage onsite
Petrol fuel	Fuel for vehicles.	No storage onsite
Oil, grease and lubricants	Vehicles and equipment.	No storage onsite

4.3.5 WASTE MANAGEMENT

The following types of waste will be generated during the construction phase, in relatively small volumes:

- Domestic waste (non-hazardous).
- Industrial waste – non-hazardous (offcuts, scrap metal, empty containers, electrical cable rolls, plastics and packaging and building rubble).
- Industrial waste – hazardous (i.e. hydrocarbon contaminated material / soil).

Waste will be contained in a manner that there can be no discharge of contamination to the environment and will be removed from site daily, for disposal at the designated landfill sites at Rehoboth and Windhoek. Recyclable items are to be sorted and stored in temporary containers and removed to relevant recycling centres (where possible).

Potential hydrocarbon spills from vehicles and machinery, as well as refuelling activities might lead to soil contamination and needs to be treated as a hazardous waste if not bioremediated. Drip trays will be placed under all stationery vehicles and machinery. Any oil spill will be scooped into bags and taken to a permitted disposal site.

4.3.6 SANITATION

Portable toilets and ablution facilities will be placed onsite to ensure that sewage is contained and disposed of appropriately.

4.3.7 FIRE MANAGEMENT

As all vegetation needs to be cleared before construction can commence, the active areas will be cleared of grass, dry wood and anything that might increase the risk of starting an unintentional fire. To avoid starting a fire, nevertheless, smoking will only be allowed in dedicated smoking areas with a sand-filled drum or similar container for disposal of cigarette butts. No open fires for cooking will be permitted to discourage wood collection and possible fires. Gas stoves must be used when required. Furthermore, fire extinguishers will be always available onsite.

4.3.8 CONSTRUCTION PHASE TIMING

Construction commencement is subject to regulatory approval, i.e. approval and issuing of an ECC by MEFT. Furthermore, the implementation of the proposed water pipeline project is subject to the formulation of an agreement between NamWater and Lodestone (see Section 1.4.3) for the supply of water from the Oanob Dam.

At this point in time (depending upon the abovementioned conditions), Lodestone plans to commence with full-scale operations at the mine towards 2025 / 2026, when the 2.0 Mm³ water per annum would be required.

Construction of the proposed pipeline and powerline would take approximately 12-18 months.

5 ALTERNATIVES

This chapter describes the various alternatives that were considered as part of the planning of the proposed project.

Although Lodestone considered various options for the layout of all mining, processing and associated infrastructure on the ML in order to ensure that all infrastructure is contained in a relatively small overall footprint (north of the C23, and restricted to the Farm Tsatsachas), these alternatives did not include the alternative options with regards to the proposed new water pipeline.

The no-go alternative, i.e. not implementing the proposed amendments to the project, represents the option not to proceed with full-scale mining, which leaves the areas of influence in their current state, including ongoing minor mining activities by Lodestone. It thus represents, largely, the original status quo (i.e. prior to the amendment application) and the baseline against which all potential project-related impacts are assessed.

Proceeding with the proposed amendments (Namisun, 2020) and implementing the full-scale project could result in positive economic impacts such as increased employment, investment and procurement of goods and services, but it could also result in negative environmental and social impacts. These potential impacts, however, were already assessed and the project approved (in the 2013 EIA). The potential impacts because of the proposed amendments were assessed / re-assessed as part of the separate EIA (amendments) process and report (Namisun, 2020).

5.1 ALTERNATIVE WATER SUPPLY OPTIONS

With reference to Section 1.2, Lodestone will require $\pm 600,000$ to $700,000 \text{ m}^3$ (maximum) water per annum for operational activities during the demonstration phase of the project. The supply from the two existing boreholes onsite, a combined production rate of 120 m^3 per day, will be utilised to supply limited potable water and supplement some of the process water requirements. However, this supply would not be sufficient to provide the projected need of $\pm 600,000$ to $700,000 \text{ m}^3$ during the demonstration phase or the $2.0 \text{ Mm}^3/\text{a}$ projected for the full-scale phase of the project. Lodestone therefore had to investigate an alternative source of water to meet their demands and plans to obtain all of its water from the Oanob Dam for both phases.

The option of groundwater supply was investigated but found to be too low yielding as well as a high risk from a supply certainty and environmental impact perspective. The only other alternative was to fully supply water from the COW which would involve a pipeline of a similar length than a pipeline from the Oanob Dam. The COW-option was not investigated because of the uncertainties

in terms of consistency in supply and water quality, as well as the routing of the pipeline. Instead, the preferred option has always been to obtain water from the Oanob Dam. Water from the Oanob Dam is also more suitable for human consumption and agricultural use – once the life of the mine had come to an end.

5.2 ALTERNATIVE ROUTING OF THE PIPELINE

Regardless the final direction and routing, it will be necessary to clear all vegetation for the full distance of the pipeline (more than 100 km) and a width of at least 20 m, i.e. a total area of 200 ha. These impacts cannot be avoided, only minimized through recommended interventions and alternative arrangements. Hereof, the most important option to minimize the impact is to take the shortest route.

Curtis Consulting (2021) stated that it is important to limit construction to as narrow a band as possible. In the same way the size of the construction sites of the pump stations and reservoirs need to be kept to a minimum. All trees that need to be removed should be clearly marked prior to construction. Wherever possible, large and healthy individuals of protected species, dense stands of protected trees, and individual trees on the edges of the servitude should be avoided, as well as the vegetation on koppies (rocky outcrops). Koppies should be avoided where possible, to minimize the impacts of construction. A pipeline above the ground is recommended in places where avoidance is impossible – but as this create a barrier for larger animals, it might be an impractical alternative.

It is proposed that bedding and filling material for the buried pipeline will be obtained from the trenches and excavations, for at least the first 80 km from Rehoboth. Material from the trenches and excavations will be screened and if suitable, be reused as much as possible. Over the last 20 km, where more hard rock excavations can be expected, borrow pits might be necessary to provide filling and bedding material. In such a case, quarrying from borrow pits should only be done in areas where there are no protected trees and on farms after an approved agreement with the respective landowner. Buffer zones of at least three meters should be maintained all around remaining protected trees.

A proposed shorter route through the undulating gravel plains is recommended, which will reduce the number of trees that need to be removed, and avoid some hills, the Stinkwater community and a potential *Lithops* habitat (Curtis Consulting, 2021).

In addition, it was recommended that the second pump station be moved further south, to avoid its proximity to two minor streams. This option was also supported by the specialist for the faunal assessment (Agri-ecological Services, 2021). See Section 8.1 for further details.

5.3 ALTERNATIVES FOR THE ASSOCIATED 33 kV POWERLINE

Three alternative power supply systems were considered for the 33 kV distribution line, namely underground cabling, solar PV, or standard overhead cabling.

From an avifaunal point of view, either of the first two options would be preferable, but both were regarded as practically unfeasible with respect to other considerations, including technical and cost aspects. The third option, i.e. standard overhead cabling, has been selected thus and the assessment is based on this option.

6 DESCRIPTION OF THE CURRENT ENVIRONMENT

An understanding of the environmental and social context and sensitivity within which the proposed project activities are being located is important to understanding the potential impacts. This chapter provides a general overview of the current baseline conditions associated with the proposed water pipeline and associated 33 kV powerline along a section of the pipeline.

This chapter was compiled utilizing the following key sources of information:

- The original / approved EIA Report (Colin Christian & Associates CC, 2013) and the supporting documents submitted as part of the renewal application in 2019.
- EIA Amendment Report and EMP for the proposed changes to the “Dordabis Iron Ore Mining Project and Associated Infrastructure” and a proposed new 132 kV powerline to the mine (Namisun, 2020).
- Visual observations during site visits by the environmental team.
- Technical information relating to the proposed new infrastructure and activities, provided by the management team of Lodestone.
- Consultations with:
 - Lodestone Management Team and the Lodestone Technical Advisors / Engineers.
 - NamWater.
 - Relevant regulatory authorities.
 - I&APs (including relevant landowners – where possible).
- Specialist reports / input:
 - Vegetation survey and assessment by Curtis Consulting (Barbara Curtis) – see Appendix G.
 - Reptiles, birds and mammals survey and assessment by Agri-ecological Services (Cornelius van der Waal) – see Appendix H.
 - Archaeological survey and assessment by J Kinahan Archaeologist (Dr John Kinahan) – see Appendix I.
 - Bird survey and assessment relating to the powerline by African Conservation Services (Dr Ann and Mike Scott) – see Appendix J.
- Atlas of Namibia (Mendelsohn et al., 2002)
- The roadside geology of Namibia (Schneider, 2004)
- Bush encroachment in Namibia (De Klerk, 2004).
- Google Earth

The baseline environment is described below, with specific spatial reference to the proposed construction of a bulk water supply pipeline and associated 33 kV powerline along a section of the pipeline to the mine.

6.1 REGIONAL CLIMATE

Like the Dordabis Iron Ore Mining Project, the climatic data relevant to the proposed pipeline is based on the interpolation of data from regional weather stations, which are all away from the route.

6.1.1 RAINFALL

Average annual rainfall increases from 250-300 mm in the west and south (i.e. around Rehoboth) to 300-350 mm in the north and east (i.e. around Dordabis), with an average rainfall variation coefficient of 30-40 % (Mendelsohn et al., 2002). Local differences in average annual rainfall figures are also apparent, as can be seen in Table 7, a summary of rainfall figures recorded at four stations near the Dordabis Iron Ore Mining Project (SLR, 2020).

TABLE 7: RAINFALL STATIONS IN THE AREA OPERATED BY METEONA

STATION	DISTANCE FROM MINE SITE	MEAN AVERAGE RAINFALL (mm)	LENGTH OF RECORD (YEARS)
Binsenheim	16 km NW	291	20
Dordabis	18 km SE	259	19
Hohenau	20 km N	335	21
Rietfontein	12 km SW	333	20

Rainfall events are limited to the summer months, between November and April, with the best rain months between December and March. Intense thunderstorms, often associated with heavy downpours over short periods, are characteristic. Flash floods may thus occur and can cause erosion. In general rainfall is erratic and highly variable, both temporarily and spatially. Almost no rainfall is recorded between June and August.

6.1.2 EVAPORATION

SLR (2020) calculated the mean annual evaporation for the mine site, based on evaporation pond estimates, within the range of 2,072.7-2,961 mm. A correction factor of approximately 30 % allows for the translation of the pond estimate to the evaporation estimate for an open surface water body. This means that mean annual evaporation for the Dordabis Iron Ore Mining Project area is calculated as 1,682 mm, vastly exceeding rainfall. Potential evaporation increases to the south and west (i.e. towards Rehoboth).

Relative humidity is low, rarely more than 20 % in winter but may reach 85 % in summer before or after thunderstorm build-up (Mendelsohn et al., 2002). This figure applies also to the area around Rehoboth.

6.1.3 TEMPERATURE

Along the proposed pipeline route, the maximum temperatures average around 30-32°C, mainly recorded during the afternoons between November and January, while minimum temperatures are around 2-4°C and are normally recorded during nights in June and July. Deviations from these averages are common, with the highest temperatures reaching 38-40°C and the lowest temperatures below 2°C. The number of frost days per year are 20-30 (Mendelsohn et al., 2002).

Airshed (2020) determined temperatures based on modelled data for the period January 2017 to December 2019 for the Dordabis Iron Ore Mining Project area. Accordingly, Airshed calculated the monthly average temperature to vary between 13°C and 25°C. Highest temperatures (~35°C) occur between November and January, and the lowest (-4°C) in July. Diurnal temperatures are the highest in the early afternoon (15h00) and the lowest just before sunrise (07h00).

Overall temperature ranges fluctuate widely between maxima and minima, daily and seasonally, creating demanding conditions for plants and animals to adapt to. In combination with the fluctuating rainfall and high potential evaporation, the demanding temperatures sustain climatic conditions sensitive to man-made interferences.

6.1.4 WIND

Due to the rhythm of prevalent air pressure systems, the wind patterns over Namibia's interior are fairly predictable. Predominant wind direction over the Dordabis Iron Ore Mining Project area is expected to be from the east and northeast with occasional airflow from the southeast and southwest during the days. During the nights the expected wind direction is west and southwest. Wind speed is expected to be low with more than two-thirds of the time lower than 2 meter per second (m/s). The stronger air movements during the afternoons and evenings are the result of the ground being heated more in some places than others. During the winter months wind speed is slightly higher (Mendelsohn, et al., 2002).

Airshed (2020) investigated the expected wind patterns closer to determine the potential of pollutant dispersal. The modelled dataset indicates wind flow primarily from the southwestern sector (Figure 6) with an average wind speed of 4.56 m/s. During the day, the predominant wind direction is from the north-northeast while the predominant wind direction during the night is from the southwest.

Wind speeds fell mostly in the 4-6 m/s category with winds between 6-8 m/s occurring for 15.4 % of the time. Winds exceeding 8 m/s occurred for 5.7 % of the time with a maximum wind speed of 18.02 m/s. The average wind speed over the period was 4.56 m/s. Calm conditions (wind speeds <1 m/s) occurred for 1.8 % of the time. Wind speeds exceeding 9 m/s occurred for 2.7 % over the period (Airshed, 2020).

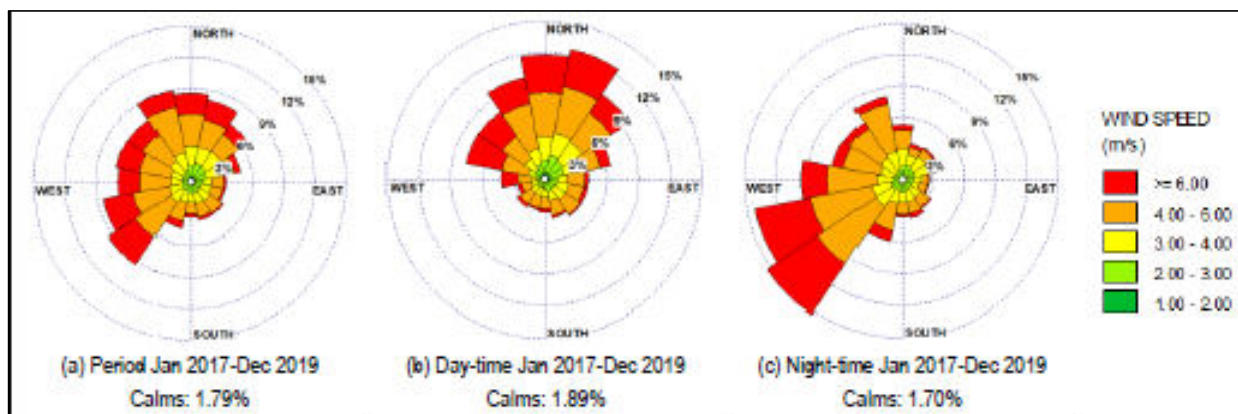


FIGURE 6: PERIOD, DAY- AND NIGHT-TIME WIND ROSES (JAN 2017 – DEC 2019)

*Airshed, 2020

6.2 GEOLOGY

Namibia can be divided into two broad geological provinces, one covering the western parts and the other in the east. The western parts consist of a variety of geological formations of different ages and composition and formed under very diverse environmental conditions – some were formed in the depths of primeval oceans, others because of the movement of the earth’s crust or because of collisions or volcanic eruptions. Most of these formations are exposed in the west as rugged landscapes of mountains, hills, valleys, and plains with sparse vegetation. In eastern Namibia, the formations are covered with sediments of a much more recent past (Mendelsohn et al., 2002). These sediments appear monotonous and uniform, covered with dense vegetation in the north and decreasing to the south. Knowledge about the sediments over eastern Namibia has been derived from water abstraction boreholes, rare outcrops and underlying formations exposed along drainage features.

The proposed pipeline route is located across these two broad geological provinces, within a zone where formations of the Damara Sequence (850 – 600 million years old) are dominant. This sequence underlies the largest parts of central Namibia and is dominated by schists of the Kuiseb and Hakos Formations, accompanied by quartz-biotite schists, interbedded marble, amphibolite and amphibolite-schists. The uniformity of the Damara Sequence is interrupted by several complexes, among which the Mokolian, Sinclair, Rehoboth, Abbabis and Hohewarte formations

count. Formations of the Nosib Group (sandstone, quartzite, conglomerate and subordinate schist) are also present, while outcrops of the Nama Group (600 – 543 million years old) are present as sedimentary rock filling synclines (Mendelsohn et al., 2002).

In the parts between Rehoboth and Dordabis, surficial deposits of the Kalahari Group (< 70 million years old), which dominates Namibia's eastern geological province, are common. Contact between the Rehoboth Sequence, the intrusive granites (Gamsberg) and the Damara Sequence lies 10 km north of Rehoboth, on the fringe of the vast peneplain covered by thick Cenozoic sediments of the Kalahari Basin (Schneider, 2004). This plain stretches over a vast part east of Rehoboth, i.e. where the routing of the pipeline is planned.

The Hohewarte Complex represents one of the most ancient crustal domains in Namibia, being more than 1,800 million years old. The complex exists of quartz-feldspar gneiss, interlayered with marble and amphibolite, and forms a dome-like structure with a diameter of approximately 40 km. The complex is enveloped by rocks of Damaran age (Schneider, 2004) and located towards the northwest of the proposed pipeline route.

6.3 TOPOGRAPHY AND SOILS

Landscape elevation increases generally from the south to the north, i.e. towards the central highlands of Namibia. In the northeast of the ML, elevations increase to more than 1700 m above mean sea level with a general decrease towards the southeast as the Skaap River and its tributaries drain the landscape.

The topography of the larger landscape is undulating, interspersed with plains. Sandy plains cover the largest parts of the western and southern parts.

In the west and especially where the Oanob Dam is located, the complex rocky outcrops (koppies) of the Rehoboth Plateau form a rugged, jagged-edge landscape. To the contrary, Rehoboth and the landscape immediately east of the town is part of the southern Kalahari, a landscape which is predominantly sandy, with endoreic drainage systems such as pans. Altitude varies between 1,380 and 1,580 m above mean sea level. Towards the southeast the landscape is increasingly dominated by linear parallel dunes covered with permanent vegetation.

East of Rehoboth the landscape flattens increasingly. Altitude around Rehoboth is slightly higher than on the sandy plains further east and south, varying between 1,570 and 1,650 m above mean sea level. Between Rehoboth and Dordabis the landscape is intersected by several shallow watercourses. Over the first stretches there are several koppies, but they are more scattered and isolated to the east. Elevations gradually dip towards the valley of the Skaap River in the east.

The other section of undulating gravel plains is from the base of the range of hills that runs west-east across D1249 (about where the second booster pump is planned) to the mine (see Figure 2). The first part of the route is a mixture of sandy and gravel plains, with hills and rocky outcrops interspersed.

Dominant soil types along the proposed pipeline route are regosols, leptosols and arenosols.

Regosols are very weakly developed mineral and nutrient-poor soils and typical of semi-arid regions prone to active erosion. Medium- to fine-textured, regosols are common on landscapes where the soils are lying in thin layers directly above the rock from which they form. Regosols are deeper than leptosols, but seldomly deeper than 50 cm. Infiltration rates are moderate to rapid (Mendelsohn et al., 2002). North of Rehoboth these soils tend to be dark grey, derived in situ by weathering of the parent rock, mica schist, which also gives it a glittering appearance.

Leptosols are typically very shallow soil over hard rock or highly calcareous material, mainly to be found in depressions, valleys, and flatter parts of the landscape. These soils appear to be derived in situ but are often mixed with aeolian sand (and ferrallic arenosols). It is also the soil type that dominates on the plains covered with surficial deposits. Leptosols are coarse-textured, often contain gravel or unweathered pieces of rock from the surroundings, gravel and pebbles and are characterized by their limited depth caused by the presence of continuous sub-surface hard rock, and often highly calcareous, especially on the plains covered with surficial deposits. Leptosols are poorly developed and thin, lack appreciable quantities of accumulated clay and organic material and are susceptible to erosion during the rainy season, especially in the beginning of the rainy season when vegetation cover is sparse (Mendelsohn et al., 2002).

Arenosols derived from Kalahari sand, is quartzitic and worked by wind. In the south ferrallic arenosols are associated with subsurface calcrete and are more characteristic of the terrains southeast of the proposed pipeline route. The red colour is due to oxidation.

In general, the soils east of Rehoboth – and especially on the plains – are nutrient-poor and lack clear horizons, which indicates limited development. As a result, natural vegetation is dominated by annual grasses and stunted woody plants except for drainage lines where the soils are generally deeper and better developed. At no surprise higher growing plants are often confined to drainage lines. On the plains the topsoil is loose and thin, also susceptible to wind erosion, especially where the vegetation cover is sparse.

6.4 HYDROGEOLOGY AND SURFACE WATER

Surface water in Namibia is a rarity due to the little rain that falls, and when it falls it either evaporates, seeps into the ground or is rapidly drained by ephemeral rivers.

North and west of Rehoboth the surface drainage is oriented towards the Oanob, Kalknaute or Usib Rivers. The Usib and Kalknaute joins the Oanob River, which ends as an endoreic system north of Kalkrand, into the surficial deposits of the Kalahari.

Most of the proposed pipeline route is situated in the upper catchment area of the ephemeral Auob River system. The combined Auob-Nossob basin drains southeast. This basin comprises two main ephemeral rivers, the Auob and Nossob, and a few less obvious fossil drainage lines, like the Olifants and Klein Nossob Rivers. Eventually the system joins the Molopo River on the border between South Africa and Botswana.

The Dordabis Iron Ore Project area is situated within the catchment of the Skaap River, which originates at the southern flank of the Auas Mountains southeast of Windhoek. The river is approximately 150 km long and drains in a southeast direction, over Dordabis and then south where it disappears south of Rehoboth as an endoreic stream on the surficial deposits of the Kalahari. The last segment of the proposed pipeline enters the catchment of the Skaap River and crosscuts some of its minor tributaries.

Two distinct aquifer types occur, and groundwater are mainly found in these two aquifers – the alluvial river aquifers and in fractured bedrock aquifers. The alluvial aquifers, hold water in intergranular pore spaces, whereas water in the fractured bedrock aquifers is held in cracks and fractures in otherwise impermeable strata.

Limited hydraulic connection between the alluvial aquifer and the bedrock aquifers is assumed with major groundwater exchange only taking place in areas where faults striking the river systems, which act as water conduits. The general direction of groundwater flow is east to southeast (Christelis and Struckmeier, 2001). Groundwater potential is moderate when associated with the sandstone, fractured quartzites and unconsolidated deposits. Metamorphic formations show a lower groundwater potential.

6.5 BIODIVERSITY

6.5.1 FLORA

Information from this section was sourced from the vegetation survey and assessment by Curtis Consulting (Barbara Curtis) (Appendix G).

The vegetation type of the central parts of Namibia, where the longest stretch of the pipeline will be constructed, is Highland Shrubland, within the Acacia Tree-and-shrub Savanna sub-biome. The landscape where the Oanob Dam is located, forms the northern tip of the Dwarf Shrub Savanna vegetation type of the Nama Karoo biome. Rehoboth and the landscape immediately east of the town forms the northwest tip of the Southern Kalahari vegetation type within the Acacia Tree-and-shrub Savanna sub-biome (Mendelsohn et al., 2002).

Noteworthy is that the higher elevations of the Highland Shrubland, particularly around Windhoek, together with the Karstveld around Otavi, Grootfontein and Tsumeb, the rivers of the northeast and some parts of the western escarpment show some of the highest plant diversity in Namibia. Plant endemism is also fairly high in the Auas Mountains south of Windhoek, the Brandberg and the Huns Mountains. Although neither diversity nor endemism is as high as immediately around Windhoek, diversity in particular, and endemism to a lesser extent, are both relatively high in the area where the pipeline is planned as compared with much of the rest of the country (Curtis Consulting, 2021). *Manuleopsis dinteri*, a shrub of up to 3 m high, is an endemic and common to higher elevations in the central parts of Namibia.

Grass, shrubs and low trees, often with a stunted growth, determine the vegetation structure of the Highland Shrubland. Where the soils are shallower, slopes are steeper and where it is hillier and rockier, the vegetation becomes progressively shrubbier. Along the proposed pipeline route, plant diversity is estimated between 150 and 299 species (Mendelsohn et al., 2002), although local differentiation is possible because of topography, soil and the availability of water. The most important environmental variable affecting the vegetation is rain, but micro-habitat conditions also play a role. Often, an increase in diversity is associated with an increase in elevation because of the differentiation in shelter, edaphic factors, and micro-climatic conditions.

Characteristic species of the Highland Shrubland are *Acacia hereroensis*, *Combretum apiculatum* and *Ozoroa crassinervia*, while the dominant woody species are *Acacia mellifera*, *Tarchonanthus camphoratus*, *Acacia reficiens*, *Combretum apiculatum*, *Searsia marlothii*, *Euclea undulata*, *Dombeya rotundifolia*, *Grewia* spp. *Boscia albitrunca* and *Albizia anthelmintica* are also common. Along the drainage lines *Acacia erioloba*, *Acacia karroo*, *Ziziphus mucronata* and *Searsia lancea* are common. The Dwarf Shrub Savanna vegetation type of the Nama Karoo biome around the Oanob Dam is characterised by low shrubs with occasional low trees. The dominant shrubs of this area are *Rhigosum trichotomum*, *Phaeoptilum spinosum* and *Lycium* spp.

Two field trips, one in the dry season (July 2020) and another in the rainy season (January 2021), were undertaken to survey the area and to determine the woody vegetation component. The full

length of the proposed pipeline route was driven, stopping periodically to walk around and look for smaller plants. Agri-ecological Services (2021) produced a habitat map for the proposed pipeline route, identifying six different habitats, which was applied by the vegetation specialist as well (Figure 7). The proposed route crosses two main habitats – the sandy plains to the south and west and the undulating gravel plains to the north, with two secondary habitats interspersed throughout (Curtis Consulting, 2021).

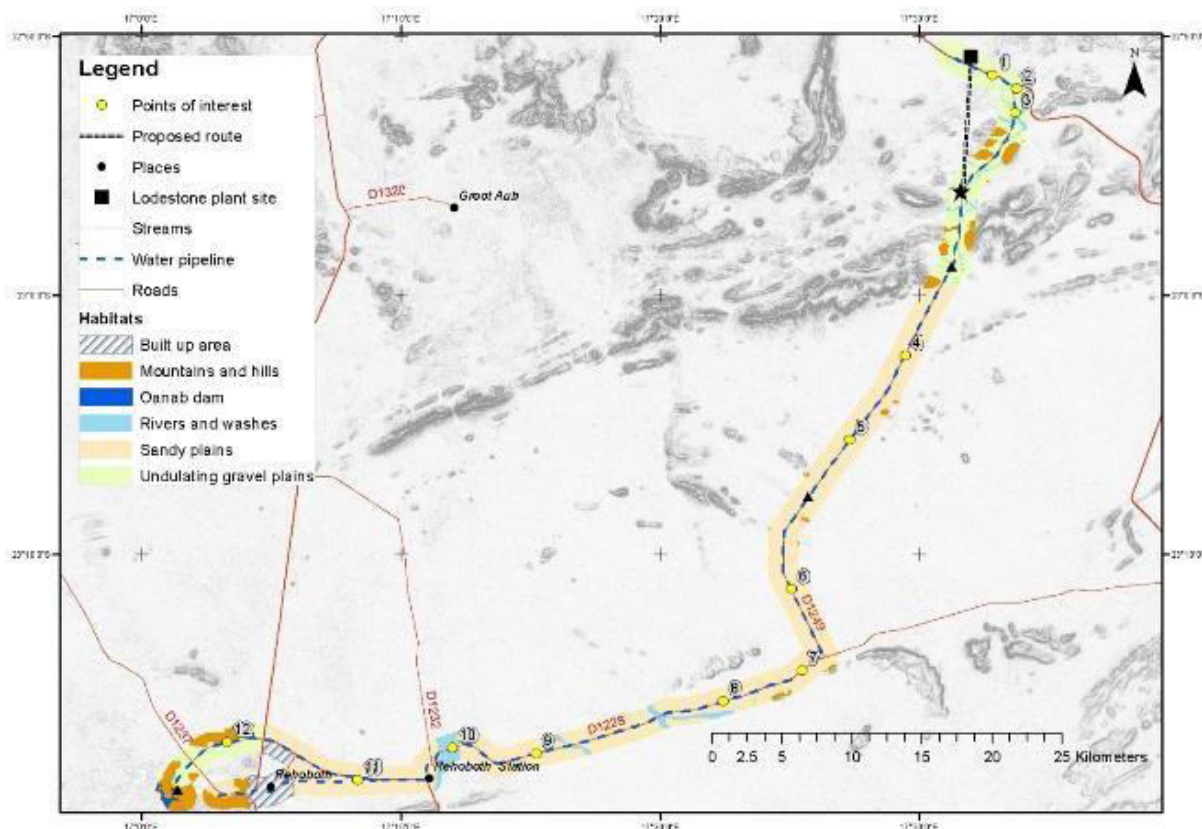


FIGURE 7: MAP OF THE PIPELINE ROUTE SHOWING THE SIX MAIN HABITATS, POINTS OF SPECIAL CONCERN AND THE PROPOSED ALTERNATIVE ROUTE TO AVOID HILLS AND ROCKY OUTCROPS

* Curtis Consulting, 2021

Curtis Consulting (2021) compiled a species list of all plants within the six quarter degree squares (QDSs) through which the pipeline will be constructed, based on a list obtained from the National Botanical Research Institute (NBRI), as well as plants seen during the field trips or likely to be encountered. Ten of the more than 170 non-woody plant species listed as potentially occurring along the route are endemic to Namibia. All are common and fairly widespread in Namibia. In addition, five protected tree species and the succulent *Aloe littoralis* were found. The trees are also widespread in Namibia (Curtis Consulting, 2021).

The largest habitat is the sandy plains in the western and southern parts. The woody component is dominated by *Acacia mellifera* (Blackthorn) – which in many cases form thickets – *Acacia reficiens*, *Rhigozum trichotomum*, *Catophractes alexandri*, and *Phaeoptilum spinosum*, with occasional *Dichrostachys cinerea* thickets. Important protected species of trees occur in this community but are common and widespread in Namibia – *Boscia albitrunca*, *Acacia erioloba*, *Albizia anthelmintica* and *Ziziphus mucronata*. Important perennial grazing grasses include *Eragrostis echinocloidea*, *Cenchrus ciliaris*, *Stipagrostis ciliata*, and the dominant grass is *Stipagrostis uniplumis* on both the deeper and shallower soils (Curtis Consulting, 2021).

Undulating gravel plains cover most of the northern section, dominated by *Acacia mellifera*, and *Tarchonanthus camphoratus*, with *Combretum apiculatum* and *Catophractes alexandri*. *Boscia albitrunca*, *Albizia anthelmintica* and *Acacia erioloba* are found scattered all along the way. The pipeline route crosses rivers and washes, as well as koppies. The koppies in general support a higher plant diversity than the surrounding plains. Those within the pipeline route are dominated by *Combretum apiculatum* with a few *Acacia hereroensis* and occasional *Searsia lancea*, *Ficus ilicina* and *Ehretia alba*. The protected *Aloe littoralis* was also seen. Smaller herbs include *Hibiscus micranthus*, *Ocimum americanum*, *Monechma divaricatum*, *Barleria lancifolia*, *Senecio eenii*, *Manulea dubia* and *Cleome oxyphylla*.

Riverine habitats are found along the drainage lines. The banks of the Skaap River, outside of the pipeline footprint, are lined with many large *Acacia karroo* and *Acacia erioloba* trees, as well as *Ziziphus mucronata* and occasional *Searsia lancea* (also protected). The riverbeds and its sandy banks are regarded as sensitive to disturbance and subject to erosion. Riverine vegetation on these parts is important for stabilising the drainage lines, retaining soils, to increase infiltration by slowing the flow, and trapping seeds, nutrients and debris for decomposition.

Riverine vegetation and the vegetation on the koppies are regarded as the most sensitive to disturbance. These landforms generally have the highest plant and faunal diversity, because of the presence of water and due to the diversity of structure and associated micro-habitats. They are most likely to be totally altered by the construction of the pipeline and will be difficult or impossible to restore. Although the koppies carry the highest plant diversity, the species present are fairly common and widespread in Namibia. Drainage lines cannot be avoided, but koppies should be avoided where possible (Curtis Consulting, 2021).

In areas where livestock is present, rangeland management practices determine bush density and grass composition. Grazing resources are made up of a wide variety of grass species, which vary widely in palatability and in their abundance. Because of the presence of livestock farming,

vast areas are affected by bush encroachment, i.e. dense stands of short, woody vegetation with *Acacia mellifera*, the most abundant species and with the herbaceous layer severely suppressed. In places the thickets are impenetrable, thus rendering the land useless to farmers (De Klerk, 2004).

Although very few aliens were encountered, apart from some *Prosopis* spp. and cacti near settlements, the potential exists for *Prosopis* spp., *Leucaena leucocephala*, *Caesalpinia gilliesii*, *Datura* sp., *Argemone archroleuca*, cacti and other aliens to multiply and spread, especially near the booster pumps and any leakages (Curtis Consulting, 2021).

6.5.2 FAUNA

Information from this section was sourced from the reptiles, birds and mammals survey and assessment by Agri-ecological Services (2021) (Appendix H).

As the central highlands of Namibia contain zones of a higher diversity, the overall terrestrial biodiversity in the area where the proposed pipeline is planned falls in an intermediary range. It is a part of Namibia with a relative high reptile diversity – 71 to 80 species; bird diversity tends to be medium-high – between 171 and 200 species and the number of mammal species ranges between 61 and 75, also medium-high. On a local scale it is expected that diversity increases with the increase in habitats, which is closely coupled to shelter, food and water availability and migration routes. The micro-climate associated with an increase in elevation plays a prominent role in this regard and is directly related to the increase in terrestrial diversity (Mendelsohn et al., 2002). This pattern was confirmed by the specialist study of Agri-ecological Services (2021).

Arid Namibia has a remarkable high level of endemism, with approximately 20 % of described species classified as endemic. At the same time the fragmentation of habitats, conflicts in land use, land mismanagement and unsustainable exploitation of target species are some of the reasons for threatening a sizable number of species in all taxa, causing several populations to be in decline. Habitat loss and ecosystem degradation in all its forms is the commonest threat facing species – this may result from various forms of development (urban, agriculture, infrastructure, etc.) and transformation (e.g., human settlement) and pollution. Other threats include over-exploitation (e.g., hunting, trapping and unsustainable harvesting), particularly to reptiles, and collecting for the pet trade, as food or for traditional medicine (Agri-ecological Services, 2021).

The six different habitats identified for the proposed pipeline route (Agri-ecological Services, 2021) were delineated as homogenous units, based on similar characteristics for animals in terms of food resources, shelter and other environmental variables, and used to stratify fieldwork sample size. The habitat map (Figure 7) was validated during a field visit and adapted

accordingly. Reptiles, birds, and small and large animals were studied. The habitat map and the field work were used to evaluate the sensitivity of the different habitats in terms of a series of criteria.

Both the sandy plains and undulating gravel plains as well as the built-up areas form habitats that are regarded as least sensitive, while the habitats of higher elevations (mountain and koppies) are regarded as sensitive and the habitat of rivers and washes are deemed as highly sensitive due to its importance as landforms that contain water (at least temporarily), its productivity and uniqueness.

The habitats of higher elevations and the habitats of rivers and washes are expected to have the highest diversity, level of endemism for reptiles and birds and offer unique habitat features such as rock faces for specialized breeders or important functions such as providing important dry season forage resources. Habitats of higher elevations constitute unique physical properties, including topography and surface roughness, different soils, water and climate regulation and hence different vegetation composition and structure and the increased availability of safe hiding and breeding places for specialized animal species. In addition, these habitats are relatively inaccessible to humans and livestock, but offer refuge to large predators such as leopard. Riverine vegetation of rivers and washes offer opportunities for roosting, nesting, hiding and feeding for several endangered, endemic and protected species. The Oanob Dam is also classified as highly sensitive but will not be impacted directly by the pipeline (Agri-ecological Services, 2021).

The habitats on the plains are generally subjected to overgrazing and heavy grazing – resulting into bush encroachment, a loss of a perennial herbaceous plant cover and soil erosion. Compared to the other habitat types, the plains would be easy to restore, but the habitat of rivers and washes regarded as difficult to restore (Agri-ecological Services, 2021).

The study revealed that 79 reptile species have distribution ranges that either overlap with the proposed pipeline route, or are very close (i.e. within a distance of 25 km). Hereof, 16 (20 %) are considered endemic or near-endemic to Namibia, and eight are endemic (90 % or more of distribution range are in Namibia). These include the common Tiger Snake (*Telescopus semiannulatus*), Western Thread Snake (*Leptotyphlops occidentalis (=Namibiana occidentalis)*), Jordan's Girdled Lizard (*Cordylus jordani (=Karusasaurus jordani)*), Bradfield's Dwarf Gecko (*Lygodactylus bradfieldi*), Festive Gecko (*Narudasia festiva*), Velvety Thick-toed Gecko (*Pachydactylus bicolor*), Hoesch's Skink (*Trachylepis hoeschi*) and Kalahari Tree Skink (*Trachylepis spilogaster*). Another eight reptile species are considered as near-endemic to

Namibia (75 to 89 % of distribution in Namibia). These include the Dwarf Beaked Snake (*Dipsina multimaculata*), South-western Shovel-snout (*Prosymna frontalis*), Western Sand Snake (*Psammophis trigrammus*), Zebra Snake (*Naja nigricollis nigricincta*), the Rough Thick-toed Gecko (*Pachydactylus rugosus*) Boulton's Namib Day Gecko (*Rhoptropus boultoni*), Dwarf Plated Lizard (*Cordylosaurus subtessellatus*) and Schinz's Beaked Blind Snake (*Rhinotyphlops schinzi*). Some species that are considered as threatened and vulnerable in Namibia, may potentially occur along the proposed pipeline route (Agri-ecological Services, 2021).

An estimated total of 44 small mammal species are expected to have distribution ranges that overlap with the proposed pipeline route. Of these, one species – the Dassie Rat (*Petromus typicus*) – is endemic to Namibia and two species are vulnerable. A total of 29 large mammal species are expected to have distribution ranges that overlap with the route. Only one species – Hartmann's Mountain Zebra (*Equus zebra*) is endemic and classified as vulnerable. Several species are facing threats in Namibia (Agri-ecological Services, 2021).

6.5.3 AVIFAUNA

African Conservation Services (2020), (Appendix J) provides a detailed description of the avifauna habitats and the species at risk to powerline collisions. The specialists study states that the Dordabis Iron Ore Mining Project area is potentially sensitive in terms of birds and their habitats – based on the existing avifauna baseline and scoping of sites and species – even though the area is not adjacent or close to any large officially protected area (ACS, 2021).

A total of 179 bird species has been recorded, a diversity that is classed as moderate–high (ACS, 2020). This figure represent 27 % of the 676 species currently recorded in Namibia. However, the avifauna specialists acknowledges that the birdlife in this part of Namibia is not well documented all over, and combined data from various sources for a more comprehensive list. Agri-ecological Services (2021), for example, recorded 220 bird species likely to occur in the area where the pipeline route is proposed. Hereof, six (2.7 %) are considered endemic or near endemic to the southern African subcontinent and six are endemic or near endemic to Namibia namely Rüppell's Parrot (*Poicephalus rueppellii*), Monteiro's Hornbill (*Tockus monteiri*), Carp's Tit (*Parus carpi*) Rockrunner (*Achaetops pycnopygius*), White-tailed Shrike (*Lanioturdus torquatus*) and Damara Hornbill (*Tockus damarensis*). Overall, Agri-ecological Services states that bird endemism is regarded as intermediate. Several species, which are considered threatened in the Namibian context, may potentially occur in the area where the pipeline is proposed (Agri-ecological Services, 2021).

Important habitats for avifauna are as follows:

- Mountainous and koppie habitats, along the route and in the vicinity provide habitat for cliff dwelling and breeding raptors, including the territorial Verreauxs' (Black) Eagle. Lower koppie habitats are also used by raptors (e.g., Tawny Eagles) and other species.
- The larger trees potentially provide nesting habitats for large raptors, including Tawny Eagle, and vultures, as well as other species.
- The more open, grassier habitats are available to species such as Secretary Bird and Kori Bustard, especially in the southern parts.
- Ephemeral, aquatic habitats and farm dams (limited). During the rainy season the former may attract waterbirds and other species by way of varying flight paths. The denser riverine bush and tree vegetation is an attractive habitat for birds.

During fieldwork in the dry season ACS observed a total of 49 bird species. The overall checklist (Appendix J) includes 11 species (6 %) that are threatened in Namibia and 16 % of the 71 species that are on the Namibian Red Data List. Five of these species are also Globally Threatened. The recorded level of endemism is considered relatively moderate-high, with at least seven species that are near-endemic to Namibia.

Nomadic / migrant habits of birds result in high mobility and consequently increase the risk of collisions on overhead structures. Both short-distance and longer bird movements are possible. One Red-listed species has migrant status, namely the Booted Eagle, a non-breeding Palearctic migrant. Other non-Red-listed migrants include Common (Steppe) Buzzard and European Honey Buzzard (both non-breeding Palearctic migrants); and Yellow-billed Kite (an intra-African migrant).

Several other (Red Data) species in the area are nomadic or make extensive movements, including White-backed Vulture, Lappet-faced Vulture, Secretary Bird, Kori Bustard, and hornbills. Juvenile raptors, in particular, may make large-scale movements. Amongst the Namibian near-endemics, several species are also nomadic.

Bird species may be sensitive, in varying degrees, to powerline impacts such as collision, electrocution and or disturbance and habitat destruction. The specialists found that the incidence of Red Data powerline-sensitive bird species per QDS is up to eight species. This density is relatively moderate, in relation to some of the surrounding QDSs (up to 23 species per QDS).

Some potential flight paths across the proposed new powerline include paths across / between mountain ranges, or along narrower kloofs; and across or along the ephemeral riverbeds.

Risk assessment and mitigation efforts are directed towards those species that have a high biological significance, or priority species, i.e. primarily Red Data species and / or species endemic or near-endemic to Namibia, as well as any Red Data migrant species. At least sixteen

species are considered potentially at risk from the proposed development, of which seven (7) are raptors.

6.6 AIR QUALITY

Except for the urban environment at Rehoboth and the settlement at Stinkwater, the main sources of air emissions are agricultural activities, and to a lesser extent from vehicles. Vehicles travelling on the nearby national, district and secondary roads release carbon dioxide, carbon monoxide, oxides of nitrogen, particulate matter, sulphur dioxide and volatile organic emission. These vehicles are also responsible for wheel-entrained dust on the gravel roads. Other potential sources of air pollution include:

- Residential use of wood for heating and cooking purposes.
- Biomass burning (veld fires).
- Bush clearance around homesteads and to increase the grazing capacity of farmland.
- Windblown dust from exposed surfaces and unpaved roads.
- Charcoal making by heating wood (or other organic substances) in the absence of oxygen.

These sources are mainly associated with the release of airborne particulates, although combustion sources would also emit carbon dioxide, carbon monoxide, oxides of nitrogen, sulphur dioxide and volatile organic compounds. Biomass burning (burning of firewood for heating and cooking, veld fires and charcoal making) gives rise to SO₂, NO₂ and PM₁₀ emissions. The contribution of all these sources to existing ambient air quality is considered very low, especially in a low-density population area such as the one under assessment.

No dust monitoring is taking place along the proposed pipeline route and the emissions listed above cannot be quantified. No ambient air quality data is available for the proposed pipeline route.

6.7 NOISE

Sources of noise in the area under assessment include the following:

- Traffic on the tar roads, the B1, C25 and C23
- Traffic on the gravel roads, D1232, D1228 and D1249.
- Traffic on other roads.
- Agricultural activities.
- Urban noise associated with the built-up areas of Rehoboth and Stinkwater.

The main receptors are farms and scattered homesteads. As a result of the predominance of extensive agricultural activities and the rural setting, ambient noise levels are low.

6.8 ARCHAEOLOGY

An archaeological / heritage assessment for the proposed pipeline route was conducted by Dr John Kinahan during the last quarter of 2020 (Appendix I). See also Figure 8.

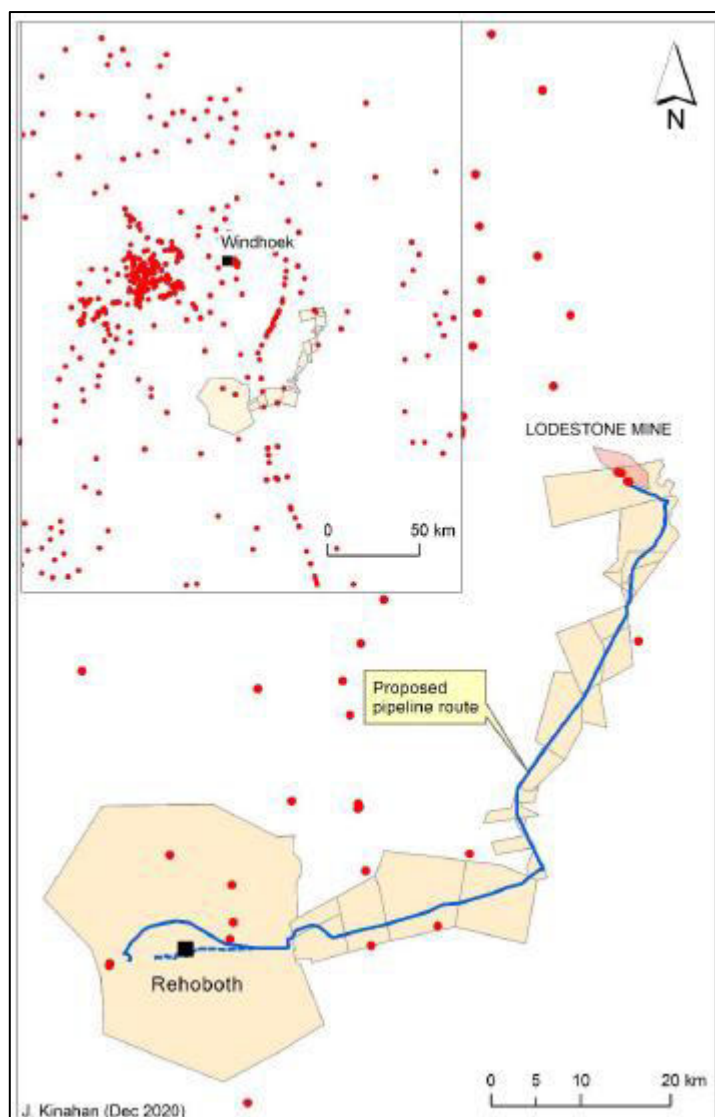


FIGURE 8: THE PROPOSED ROUTE OF THE PIPELINE (AND ASSOCIATED KV POWERLINE) FROM OANOB DAM TO LODESTONE MINE

*Kinahan, 2021

Known archaeological / heritage sites are indicated as red dots

The proposed pipeline route traverses an area with a relatively sparse distribution of previously known archaeological / heritage sites. As the pipeline route (and associated 33 kV powerline along a section of the pipeline) is largely confined to the road reserves of four interlinked district roads, most of the land was previously disturbed and therefore of low archaeological significance. Several archaeological sites occur on the sandy plains east of Rehoboth. Most of these are associated with the ephemeral pans present in this area, and the sites are generally well preserved. No archaeological sites were found within the road corridor or in the area adjacent to it, however (Kinahan, 2020) (see Figure 8).

The specialist assessment did not locate any further archaeological / heritage sites which would merit protection under the National Heritage Act, No. 27 of 2004. Existing knowledge from archaeological documentation and the results of field survey indicates that the proposed alignment of the pipeline will have minimal archaeological impact. The route of the proposed pipeline is therefore not considered to be archaeologically sensitive. However, it is possible that buried archaeological remains may be found during earthworks, but there is a generally low likelihood that this will occur, due to the fact that much of the road reserve has been subject to earthmoving in the course of past road construction (Kinahan, 2020).

The strongest association between terrain features and archaeological sites involves ephemeral pans and koppies. These features are overall located at some distance from the pipeline route which will therefore not have a significant impact on the terrain setting of the local archaeology.

6.9 LAND USE AND CLOSEST SENSITIVE RECEPTORS

6.1.1 LAND USE

In addition to the Rehoboth Townlands, the proposed pipeline will pass through 16 privately owned farms (see Figure 2). Except for urban land use at Rehoboth and the settlements on the farm Stinkwater, the land is used for extensive farming activities, mainly for the production of cattle, sheep and goats. Some farms are game proof fenced, suggesting the utilising of game for tourism or hunting. Crop production is limited, only practiced on the farm Coas 457 where Namib Roses grows flowers and cultivate seedlings and plants for the Namibian market. Namib Roses employ people from Stinkwater and supports more than 150 people in total.

The estimated long-term carrying capacity of the land ranges between 12 and 15 kg animal biomass / ha / annum and decreases from northeast to southwest (Agri-ecological Services, 2021). Bush encroachment affects large parts, mainly because of *Acacia mellifera* thickets, rendering the land useless to farmers.

In general stock carrying capacity is low and variable, employment is low per farm unit and capital investment is relatively high to returns. Overall, the proposed pipeline route is located on rural land that is sparsely populated.

6.1.2 CLOSEST SENSITIVE RECEPTORS

The closest sensitive receptors to the proposed pipeline include the existing landowners and neighbours. Residents of Rehoboth and Stinkwater are identified as receptors too. No other urban place occurs and all people outside Rehoboth and Stinkwater live in isolated homesteads, in some cases clustered together in close vicinity of each other like in the case of Stinkwater.

Stinkwater, like many farms in the Rehoboth district, have been owned by families in the Baster community. Over generations these farms have been sub-divided and inherited by the children of the next generation. Over the years, Stinkwater has become an informal settlement and now has between 150 -180 households spread out along the Skaap River.

7 IDENTIFICATION AND DESCRIPTION OF POTENTIAL ENVIRONMENTAL IMPACTS

This chapter outlines the environmental aspects and potential impacts associated with the construction and operations of the proposed bulk water supply pipeline and associated 33 kV powerline along a section of the pipeline.

7.1 ASPECT AND IMPACT IDENTIFICATION

Table 8 provides a summary of the activities associated with the proposed bulk water supply pipeline (and associated 33 kV powerline along a section of the pipeline) from Oanob Dam to the mine site in relation to the environmental aspects and potential impacts.

The potential impacts were identified during the scoping process, in consultation with authorities, I&APs and the project team. For context, the description of the potential impacts should be read with the corresponding descriptions of the current environment in Chapter 6 of this report.

The relevance of the potential impacts (“screening”) is also presented in the tables below to determine which aspects need to be assessed in further detail (Chapter 8 of this report).

TABLE 8: ENVIRONMENTAL ASPECTS AND POTENTIAL IMPACTS ASSOCIATED WITH THE BULK WATER SUPPLY PIPELINE

ASPECT	POTENTIAL IMPACT	RELEVANCE (SCREENING) OF POTENTIAL IMPACT
Activity / Facility: Clearance, construction activities and the use of vehicles, equipment and machinery		
<p>Clearance of zones where construction will take place (including trenching and excavation for and laying of the pipeline and powerline, building of pump houses and reservoirs), as well as clearance of the accompanying servitude.</p> <p>Cutting into rocky outcrops.</p> <p>Construction across rivers and washes.</p> <p>Construction of service and access roads.</p> <p>Use of machinery, vehicles, equipment, etc. for clearance, excavations, general construction, laying and coupling of the pipeline, filling and bedding of the trenches, resurfacing and sloping of disturbed areas and general decommissioning activities</p>	<p><u>Biodiversity</u></p> <p>Potential impact on biodiversity (physical impacts and general disturbance):</p> <ul style="list-style-type: none"> • Loss of habitat (including isolated / “island” habitats) • Loss of individual organisms (including specialists) • Loss of landscape connectedness • Interference, disturbance and displacement of invertebrates (individuals, populations and concentrations or groups) • Interruptions or restrictions of migration patterns • Disturbance of surface water flow patterns and impacts (downstream) • Drowning of organisms in open water bodies • Introduction of invasive alien plants • Illegal harvesting of wood from protected species, and illegal collecting of protected species such as aloes. 	<p><u>Vegetation (Flora):</u></p> <p>Total destruction of individual, large, protected trees as a result of the total removal of vegetation within an area of 101 km x 20 m, plus additional clearance for access roads, building sites and borrow pits, cannot be avoided (Curtis Consulting, 2021). As such, the impact can only be minimized by taking the shortest possible route and limiting the clearance areas to the minimum. The significance rating of this impact is assessed as high in the unmitigated scenario and reduced to moderate in the mitigated scenario.</p> <p>By far most of the vegetation along the route is indigenous invader bush, which can easily be cleared without any detrimental impact. Five protected tree species are also found along the route of the proposed pipeline, three of which are widespread and will be impossible to avoid. Many individual protected plants will need to be removed – but the overall impact on any one farm will not be great because the impacts will be localized. In addition, the species affected are fairly common and widespread in Namibia.</p> <p>Invasive alien plants can establish on areas of disturbance. The significance rating of this impact is assessed as moderate in the unmitigated scenario. Through mitigation and management measures the significance rating can be reduced to low.</p> <p>A minor impact could be illegal harvesting of camelthorn wood or aloes by construction and maintenance workers. The significance rating of this impact is assessed as low (with constant checking) in the unmitigated scenario and the significance of the impact can be reduced and kept to low under the mitigated scenario.</p> <p>Potential impacts on vegetation are further assessed in Section 8.1.</p> <p><u>Fauna:</u></p> <p>Agri-ecological Services (2021) stated that the potential impact of destruction on habitats and organisms can be of a moderate significance rating in the unmitigated scenario. This can be caused by the clearing or partial clearing of land, the felling of large trees and shrubs, construction of service roads, excavations, the construction of pump stations and reservoirs, and the use of roads by vehicles and machinery. Construction activities may interfere with the movement of animals or disturb them, in particular residential and slow-moving animals, or interrupt migration patterns. Security fencing can restrict the movement of animals. Open water bodies can cause a drowning hazard for animals. It would be hard to reduce the significance rating of</p>

ASPECT	POTENTIAL IMPACT	RELEVANCE (SCREENING) OF POTENTIAL IMPACT
	<ul style="list-style-type: none"> • Illegal killing (poaching) and collecting of animals • Accidental killing and harming of organisms (e.g., road kills) • Noise, dust, light and chemical pollution 	<p>this impact, as it cannot be avoided but only minimized by taking the shortest route and through recommended interventions and alternative arrangements.</p> <p>Impacts because of poaching, killing of animals and the illegal harvesting / collection of organisms by construction and maintenance crews are assessed as having a moderate significance rating in the unmitigated scenario. The bulk of this impact is expected during the construction phase. With mitigation, the significance rating can be reduced to low.</p> <p>Impacts because of noise, dust, light and chemical pollution are assessed as having a low significance rating in the unmitigated scenario. With mitigation, the significance rating can be reduced to low.</p> <p>Impacts because of filling (rehabilitation) of trenches, resurfacing and sloping, the decommissioning of redundant concrete, pipes, pump installations and reservoirs are assessed as having a low significance rating in the unmitigated scenario. With mitigation, the significance rating can change to moderate positive. Although this impact is overall positive, some of the activities can be coupled to disturbance, interference, or degradation.</p> <p>Potential impacts on fauna are further assessed in Section 8.1.</p>
Powerlines (existing and proposed)	<ul style="list-style-type: none"> • Interference, disturbance and displacement of birds • Interference or loss of bird habitats, flightpaths, corridors or flyways • Harming and killing of birds as a result of collisions and or electrocution 	<p><u>Avifauna (specifically with regards to powerlines):</u></p> <p>The construction of powerlines and its associated infrastructure may cause interferences with birds and their habitats. Birds may be disturbed while going about their daily activities such as feeding, roosting and, in particular, breeding. This may lead to displacement and a reduction in the breeding success of birds. The specialist study identifies priority bird species that may potentially be impacted by disturbance during construction activities, as well as habitats that are sensitive to bird disturbance.</p> <p>Although the collision of birds with overhead powerlines may take place during the construction phase as well, it occurs predominantly during the operational phase.</p> <p>Collisions occur when birds in mid-flight do not see overhead cables or powerline structure until it is too late to take evasive action. This can happen on any part of a powerline, but it is more likely to occur in known flightpaths or corridors of flyways, such as valleys or drainage courses. Collisions may also take place on stay and ground wires, conductors, against strain poles and at bend points.</p> <p>Potential impacts on avifauna are further assessed in Section 8.1.</p>

ASPECT	POTENTIAL IMPACT	RELEVANCE (SCREENING) OF POTENTIAL IMPACT
<p>Clearance of zones where construction will take place (including trenching and excavation for and laying of the pipeline and powerline, building of pump houses and reservoirs), as well as clearance of the accompanying servitude.</p> <p>Construction across rivers and washes.</p> <p>Construction and use of service and access roads.</p> <p>Use of machinery, vehicles, equipment, etc. for clearance, excavations, general construction, laying and coupling of the pipeline, filling and bedding of the trenches, resurfacing and sloping of disturbed areas and general decommissioning activities</p>	<p><u>Topsoil</u></p> <ul style="list-style-type: none"> • Loss of / disturbance of valuable topsoil (e.g., erosion – wind and water) • Compaction and trampling of soil • Pollution and contamination of soil • Invasion by alien species 	<p>In the area to be affected, topsoil is shallow but nevertheless essential to plant growth and can be affected by erosion as a result from construction (vegetation removal, clearance and levelling, excavation, bedding and filling) combined with the potential of flash floods, as well as invasions by both alien and indigenous species.</p> <p>The potential of hydrocarbon spillages from construction vehicles (also during the refuelling of machinery and equipment) is always a possibility in the construction and related areas. Hydrocarbon spillages does have the potential to cause an impact on soil. Impacts as a result of contamination (mainly through accidental spills of hydrocarbons, chemicals, etc) were indicated in the previous assessments as having a moderate significance rating in the unmitigated scenario.</p> <p>The bulk of the impacts on topsoil is expected during the construction phase. Although the impacts are localized, the significance is rated as high in the unmitigated scenario, which can be reduced to low in the mitigated scenario.</p> <p>Potential impacts on soil are further assessed in Section 8.2.</p>
<p>Clearance of zones where construction will take place (including trenching and excavation for and</p>	<p><u>Archaeology</u></p> <ul style="list-style-type: none"> • Potential destruction or damage to archaeological / heritage sites 	<p>As the pipeline route is largely confined to road reserves, most of the land was previously disturbed and therefore of low archaeological significance. The proposed alignment of the pipeline will have minimal archaeological impact thus (Kinahan, 2020).</p>

ASPECT	POTENTIAL IMPACT	RELEVANCE (SCREENING) OF POTENTIAL IMPACT
<p>laying of the pipeline and powerline, building of pump houses and reservoirs), as well as clearance of the accompanying servitude.</p> <p>Construction and use of service and access roads.</p> <p>Use of machinery, vehicles, equipment, etc.</p>		<p>A number of archaeological sites occur on the sandy plains east of Rehoboth. Most of these are associated with the ephemeral pans present in this area, and the sites are generally well preserved. However, no archaeological sites were found within the road corridor or in the areas adjacent to it through this part. (Kinahan, 2020)</p> <p>The pipeline route traverses an area with a relatively sparse distribution of previously known archaeological / heritage sites. It is possible that buried archaeological remains may be found in the course of earthworks, but there is a generally low likelihood that this will occur (Kinahan, 2020).</p> <p>Potential impacts on archaeology are further assessed in Section 8.3.</p>
<p>Use of machinery, vehicles and equipment for all types of construction and associated activities</p>	<p><u>Surface and groundwater</u></p> <ul style="list-style-type: none"> • The quality and quantity of surface and groundwater water can be compromised through potential contamination and effluent discharges and changes to flow patterns • The erosion potential can increase • The flow patterns of surface water can be altered and lead to impacts downstream 	<p>The potential of hydrocarbon spillages from construction vehicles (also during the refuelling of machinery and equipment) is always a possibility in the construction and related areas. Hydrocarbon spillages does have the potential to cause an impact on soil and even groundwater.</p> <p>Impacts because of contamination (mainly through accidental spills of hydrocarbons, chemicals, etc.) were indicated in the previous assessments as having a moderate significance rating in the unmitigated scenario overall. The bulk of this impact is expected during the construction phase. With mitigation, the significance rating can be reduced to low.</p> <p>Some of the recommended interventions and alternative arrangements are:</p> <ul style="list-style-type: none"> • Sensitive areas should be avoided as far as possible, and the shortest possible crossings of washes and rivers should be taken as the drainage lines sustain riverine vegetation, provides connectedness and functions as a source of (albeit seasonal) water. • A sound clean-up and restoration plan for areas affected by contamination should be implemented. • Because riverbanks and riverbeds are sensitive to disturbance, and subjected to erosion, these sites need to be stabilized after disturbance. <p>Recommended management and mitigation measures are captured in the EMP. No further assessment required.</p>

ASPECT	POTENTIAL IMPACT	RELEVANCE (SCREENING) OF POTENTIAL IMPACT
Use of machinery, vehicles and equipment for all types of construction and associated activities	<u>Land use</u> <ul style="list-style-type: none"> • Creating and use of servitude • Access • Interruptions of farming activities 	<p>The proposed bulk water supply pipeline and its related infrastructure will affect existing land use and land use potential on the adjacent farmland. Although some degree of interruption of farming activities during the construction phase is possible, the biggest impacts on land use relate to the servitude and access roads.</p> <p>The servitude will be located outside the road reserve, in most cases on private land, where grazing and related land use will be possible. No new structures are allowed in the servitude.</p> <p>As far as possible, no new roads will be created, and only existing proclaimed roads and private access roads will be used.</p> <p>During the operational phase, possible interruptions will be reduced to maintenance activities.</p> <p>Some generic impacts during both phases are possible – improper waste management, illegal activities such as poaching, stock theft and the collecting of organisms, access without permission, and interruptions caused by gates that are left open, disturbance to animals and accidental fires.</p> <p>The significance of the impact is rated as moderate for the unmitigated scenario and low for the mitigated scenario. Mitigation and management measures are contained in the EMP.</p> <p>No further assessment required.</p>
Handling, storage and disposal of waste	<u>Pollution of land, water and air</u> <ul style="list-style-type: none"> • Effluent discharge from waste and sewerage into soil and water • Emissions to land and air • Impacts on biodiversity • General degradation and nuisance impacts 	<p>Impacts because of improper waste management, the handling, storage and disposal of sewerage is always possible and have the potential to cause an impact on soil, water and air. Impacts were indicated in the previous assessments as having a moderate significance rating in the unmitigated scenario overall. With mitigation, the significance rating can be reduced to low. Mitigation and management measures are contained in the EMP.</p> <p>No further assessment required.</p>
Use of machinery, vehicles and equipment for all types of construction and associated activities	<u>Noise</u> Noise disturbance to third parties (sensitive receptors).	<p>The limited nature of the construction activities will not result in significant noise generation and the cumulative impacts will therefore not change, when compared with previous assessment findings. As a result, noise is screened out as a potential issue.</p> <p>No further assessment required.</p>

ASPECT	POTENTIAL IMPACT	RELEVANCE (SCREENING) OF POTENTIAL IMPACT
Use of machinery, vehicles and equipment for all types of construction and associated activities	<u>Dust</u> Dust from construction activities causing impacts to third parties	Barren soils during construction will be restricted to a narrow strip. It is therefore not likely to result in large-scale windblown dust emissions. Existing roads and access roads will be used; a significant increase of dust is not expected, and the cumulative impacts will not change, when compared with previous assessment findings. As a result, dust is screened out as a potential issue. No further assessment required.
Overhead powerline and pump stations	<u>Visual</u> <ul style="list-style-type: none"> • Intrusive impacts on views and sense of place 	The visual resources of the proposed pipeline route can be rated as having a moderate to high quality, with the topography of the larger landscape being undulating, interspersed with plains. Sandy plains cover the largest parts of the western and southern parts. Sensitive receptors include the identified farm homesteads. The users of the D1249 gravel road are also receptors. Seeing that the proposed pipeline will be buried, no visual impacts are expected, except during the construction phase of the project. However, new reservoirs and pump stations will be constructed along the route, which could also have a visual impact. Potential visual impacts associated with the 33 kV overhead powerline and reservoirs and pump stations are further (qualitatively) assessed in Section 8.4.
Employment and income	<u>Socio-economic impacts</u> <ul style="list-style-type: none"> • Job creation and skills development • In-migration • Impacts to the local, regional and national economy • Third party health, safety and security • Interrupted and compromised land use activities on affected commercial farms. 	Potential socio-economic impacts (both positive and negative) for the overall Dordabis Iron Ore Project were assessed previously. Direct employment benefits were assessed as high (+) and other indirect and economic benefits assessed as medium (+). Potential negative impacts were assessed as low to medium. The impacts related to the construction of the pipeline and associated 33 kV powerline along a section of the pipeline are short-term and localized, as construction will be done by a small work team over a specific period. Overall, the potential cumulative impacts will remain relatively similar to previous assessments but may contribute to cumulative spin-offs. Moreover, no further assessment is required.

8 ENVIRONMENTAL IMPACT ASSESSMENT

This chapter assesses the key potential impacts (as identified in Chapter 7) of the proposed bulk water supply pipeline (and associated 33 kV powerline along a section of the pipeline).

The environmental issues that require further assessment, as identified in Chapter 7, relate to:

- Impacts on vegetation.
- Impacts on fauna.
- Impacts on birds (with specific reference to the accompanying powerline).
- Impacts on soil.
- Impacts on archaeology.
- Visual impacts (associated with the new powerline).

The activities that are summarised in this chapter, link to the description of the proposed project (Chapter 4). This chapter must further be read in the context of the baseline conditions described in Chapter 6.

Management and mitigation measures to address the identified (potential) impacts are presented in the EMP that accompanies this report.

Both the criteria used to assess the impacts and the method of determining the significance of the impacts are outlined in Table 9, Table 10 and Table 11.

This method complies with the Environmental Management Act, No. 7 of 2007 and its regulations. Table 9 provides the impact assessment criteria and the approach for determining impact consequence (combining nature and intensity, extent and duration) and impact significance (the overall rating of the impact). Impact consequence and significance are determined from Table 10 and Table 11 respectively. The interpretation of the impact significance is given in Table 9. Both mitigated and unmitigated scenarios are considered for each impact.

The potential impacts are cumulatively assessed, where relevant, taking the existing environment into consideration.

TABLE 9: IMPACT ASSESSMENT CRITERIA

IMPACT ASSESSMENT CRITERIA		
SIGNIFICANCE determination	Significance = consequence x probability	
CONSEQUENCE	Consequence is a function of: <ul style="list-style-type: none"> • Nature and Intensity of the potential impact • Geographical extent should the impact occur • Duration of the impact 	
Ranking the NATURE and INTENSITY of the potential impact		
Negative impacts		
Low (L)	The impact has no / minor effect/deterioration on natural, cultural and social functions and processes. No measurable change. Recommended standard / level will not be violated. (Limited nuisance related complaints).	
Moderate (M)	Natural, cultural and social functions and processes can continue, but in a modified way. Moderate discomfort that can be measured. Recommended standard / level will occasionally be violated. Various third party complaints expected.	
High (H)	Natural, cultural or social functions and processes are altered in such a way that they temporarily or permanently cease. Substantial deterioration of the impacted environment. Widespread third party complaints expected.	
Very high (VH)	Substantial deterioration (death, illness or injury). Recommended standard / level will often be violated. Vigorous action expected by third parties.	
Positive impacts		
Low (L) +	Slight positive effect on natural, cultural and social functions and processes Minor improvement. No measurable change.	
Moderate (M) +	Natural, cultural and social functions and processes continue but in a noticeably enhanced way. Moderate improvement. Little positive reaction from third parties.	
High (H) +	Natural, cultural or social functions and processes are altered in such a way that the impacted environment is considerably enhanced /improved. Widespread, noticeable positive reaction from third parties.	
Very high (VH) +	Substantial improvement. Will be within or better than the recommended level. Favourable publicity from third parties.	
Ranking the EXTENT		
Low (L)	Local (confined to within the project concession area and its nearby surroundings).	
Moderate (M)	Regional (confined to the region, e.g. coast, basin, catchment, municipal region, district, etc.).	
High (H)	National (extends beyond district or regional boundaries with national implications).	
Very high (VH)	International (Impact extends beyond the national scale or may be transboundary).	
Ranking the DURATION		
Low (L)	Temporary/short term. Quickly reversible. (Less than the life of the project).	
Moderate (M)	Medium Term. Impact can be reversed over time. (Life of the project).	
High (H)	Long Term. Impact will only cease after the life of the project..	
Very high (VH)	Permanent	
Ranking the PROBABILITY		
Low (L)	Unlikely	
Moderate (M)	Possibly	
High (H)	Most likely	
Very high (VH)	Definitely	
SIGNIFICANCE Description		
	Positive	Negative
Low (L)	Supports the implementation of the project	No influence on the decision.
Moderate (M)	Supports the implementation of the project	It should have an influence on the decision and the impact will not be avoided unless it is mitigated.
High (H)	Supports the implementation of the project	It should influence the decision to not proceed with the project or require significant modification(s) of the project design/location, etc. (where relevant).
Very high (VH)	Supports the implementation of the project	It would influence the decision to not proceed with the project.

TABLE 10: DETERMINING THE CONSEQUENCE

DETERMINING THE CONSEQUENCE					
INTENSITY OF IMPACT = LOW					
DURATION	VH	Moderate	Moderate	High	High
	H	Moderate	Moderate	Moderate	Moderate
	M	Low	Low	Low	Moderate
	L	Low	Low	Low	Moderate
INTENSITY OF IMPACT = MODERATE					
DURATION	VH	Moderate	High	High	High
	H	Moderate	Moderate	High	High
	M	Moderate	Moderate	Moderate	Moderate
	L	Low	Moderate	Moderate	Moderate
INTENSITY OF IMPACT = HIGH					
DURATION	VH	High	High	Very High	Very high
	H	High	High	High	Very High
	M	Moderate	Moderate	High	High
	L	Moderate	Moderate	High	High
INTENSITY OF IMPACT = VERY HIGH					
DURATION	VH	Very high	Very High	Very High	Very high
	H	High	High	Very High	Very high
	M	High	High	High	Very High
	L	Moderate	High	High	Very High
		L	M	H	VH
EXTENT					

TABLE 11: DETERMINING THE SIGNIFICANCE

DETERMINING THE SIGNIFICANCE					
PROBABILITY	VH	Moderate	High	High	Very high
	H	Moderate	Moderate	High	Very high
	M	Low	Moderate	High	High
	L	Low	Low	Moderate	High
		L	M	H	VH
CONSEQUENCE					

8.1 BIODIVERSITY

The biodiversity and, more particularly, sensitive habitats have been discussed in Section 6.5. The physical footprint of the pipeline is relatively restricted to a servitude along the existing district roads, access roads, the proposed strip of land which will be disturbed because of excavations and laying of the pipeline, the construction sites where the pump houses and reservoirs will be built, and the accompanying powerline over a portion of the pipeline. During the construction activities temporary impacts will be caused by the workforce, vehicles, machinery, equipment and the laydown of construction materials. In the operational phase, ongoing activities will be reduced to limited vehicle and people movements because of continuous maintenance and inspections.

8.1.1 ISSUE: PHYSICAL DESTRUCTION OF VEGETATION AND ASSOCIATED HABITATS, PARTICULARLY SENSITIVE HABITATS AND PROTECTED PLANT SPECIES

The total destruction of individual, large, protected trees as a result of the total removal of vegetation within an area of 100 km x 20 m, plus additional clearance for access and the building

sites of the pump houses and reservoirs cannot be avoided. As such, the impact can only be minimized by taking the shortest possible route and limiting the areas to be cleared.

Five protected tree species are found along the route of the proposed pipeline, three of which are widespread and will be impossible to avoid. Many individual protected plants will need to be removed – but the overall impact on any one farm will not be great because the impacts will be localized. In addition, the species affected are fairly common and widespread in Namibia.

In the sandy plain habitats, stands of large camel thorns, *Acacia erioloba*, will have to be removed, as well as individuals of *Boscia albitrunca* and *Albizia anthelmintica*. All three species occur, mostly as scattered individuals, on the undulating gravel plains as well. The other two species, *Ziziphus mucronata* and *Searsia lancea*, occur in small numbers in the rivers and washes. *Searsia lancea* also occurs on the rocky outcrops, where *Aloe littoralis* also occurs. Although not seen in along the proposed pipeline route, the endemic *Manuleopsis dinteri* is known to occur commonly on hills in the Khomas Hochland and has been found at the mine site.

By far most of the vegetation along the route is indigenous invader bush, which can easily be cleared without any detrimental impact.

Assessment of Impact

Nature and intensity, duration of impact and geographical extent

The impact intensity is rated as moderate as natural functions and processes can continue. This can be lessened with careful control of construction work and shortening the route. The duration of the impact is very high, since all protected trees present will need to be permanently removed, and considering the long period vegetation, especially trees, needs to grow back. The extent of the impact is low because it is localized.

Consequence

The consequence of the impact is considered as moderate for both the unmitigated scenario and mitigated scenarios.

Probability

The impact will definitely occur (very high).

Significance

The significance of the impact is rated as **high** for the unmitigated scenario (where construction work may damage an area larger than the absolute minimum needed). Although the significance

of the impact is high, it is very localised and will not affect the overall population of any of the affected species, all of which are common and widespread throughout Namibia. None of the habitats is unique, and all may also be found elsewhere. Management and mitigation measures are possible, and the impact can be minimized when interventions and alternative arrangements are implemented, reducing the significance to **moderate**.

Tabulated summary of the assessed impact – Physical destruction of vegetation and associated habitats, particularly sensitive habitats and protected plant species

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	M	H	L	M	VH	H
Mitigated	L-M	M	L	M	H	M

Management and mitigation measures

The impacts of the pipeline are best reduced by taking the shortest route for the pipeline.

Sensitive areas and areas of particular concern where protected plants are concentrated were identified and indicated on Figure 7, with the purpose to recommend specific avoidance or specific mitigation measures. If dense stands of protected trees can be avoided, and the overall length of the pipeline route can be shortened as outlined, so much the better. The shorter the route, the fewer protected trees need to be removed. Cutting out the hill slope at the C23 / D1249 road intersection will also avoid any disturbance to a potential Lithops site (Figure 7). It would also avoid the steep sides of the two tributaries to the Skaap River. Although it still crosses these tributaries, this will be further from the Skaap River, where the latter are smaller, with less steep banks. Moving the location of the second pump station further south, will avoid its proximity to the two minor streams.

Specific mitigation measures are:

- Limit access routes to the construction areas to a minimum number of points.
- Access points should be through existing farm gates, where possible.
- Large vehicles need to be confined to the servitude and not allowed to turn around randomly in the bush.
- Turning areas and temporary dumping sites should be in areas where very few or, preferably, no protected tree species occur.
- Materials removed from the trenches for the pipeline must be placed in the servitude, where possible, until they can be deposited in their final disposal sites.

- Quarrying for bedding and filling material should only be done in areas where there are no protected trees.
- The size and number of borrow pit areas need to be minimized.
- Buffer zones of at least three meters should be maintained all around protected trees.

Protected plant species are declared as such by Section 22 (1), 23 (1) of the Forest Act, No. 12 of 2001 and the Forest Regulations of 2015. Accordingly, a permit is needed from the Directorate of Forestry if these are to be removed. Aloes are protected as well, but can be transplanted to a safe alternative location, also with a permit from the Directorate of Forestry. For any tree cutting in an area greater than 15 ha, a permit is required from the Directorate of Forestry, as stated under Section 22 (1), 23 (1) of the Forest Act, No. 12 of 2001. A permit is also required for the transport of any wood or wood products, for the sale and or export of any wood or wood products.

The total habitat that will be destroyed by the construction of the proposed pipeline is a minimum of 200 ha. Since this area exceeds the allowable 15 ha, a permit from the Directorate of Forestry is required, as stated under Section 22 (1), 23 (1) of the Forest Act, No. 12 of 2001.

8.1.2 ISSUE: ILLEGAL HARVESTING OF CAMELTHORN WOOD OR ALOES

Curtis Consulting (2021) identified the possible illegal harvesting of camelthorn wood or aloes by construction and maintenance workers as a minor impact.

Assessment of Impact

Nature and intensity, duration of impact and geographical extent

The impact intensity is rated as moderate if uncontrolled, but low in the mitigated scenario, because it is controllable and has minor effects on the natural functions and processes. The duration of the impact is low (short term, just during construction) and the extent of the impact is low, because it is confined to the strip of land in proximity of the proposed pipeline route.

Consequence

The consequence of the impact is considered as low, with constant checking for the mitigated scenario.

Probability

The probability is moderate – because it is likely that people will take the opportunity when it occurs if not controlled but may be reduced to low in the mitigated scenario.

Significance

The significance of the impact is rated as **low** for both scenarios.

Tabulated summary of the assessed impact – Illegal harvesting of camelthorn wood or aloes

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	M	L	L	L	M	L
Mitigated	L	L	L	L	L	L

Management and mitigation measures

- Strict rules and penalties need to be imposed on construction workers regarding illegal harvesting of wood from protected trees.
- Strict control over removal of aloes.
- Allow construction workers to take wood from felled invader trees and bush.
- Provide adequate competency training and awareness.
- Apply strict supervision and control.

Should anyone wish to use the wood from the protected trees that are felled, permission should be obtained from the landowner, and the necessary permits obtained from the Directorate of Forestry.

8.1.3 ISSUE: PHYSICAL DESTRUCTION OF HABITATS AND ANIMALS

Agri-ecological Services (2021) states that the total destruction of some habitats and organisms – as a result of the clearing or partial clearing of land, the felling of large trees and shrubs, construction of service roads, trenching, excavating, the creating of borrow pits, the construction of pump stations and reservoirs, and the use of roads by vehicles and machinery – cannot be avoided and is a certainty.

Construction activities may interfere with the movement of animals or disturb, harm or kill them, in particular residential and slow-moving animals, or interrupt migration patterns. Trenches, albeit temporary, can restrict and interrupt the movement of animals while security fencing can restrict animal movements permanently. Open water bodies can cause a drowning hazard for animals. The removal of big trees and shrubs imply that animals are deprived of shelter, food and hiding.

It would be hard to reduce the significance rating of this impact, as it cannot be avoided but only minimized by taking the shortest route and limit the areas to be disturbed.

Assessment of Impact

Nature and intensity, duration of impact and geographical extent

The impact intensity is rated as moderate. The duration of the impact is moderate, considering the detrimental effects when a habitat is destructed. The extent of the impact is moderate, because the impacts may have influences beyond the footprint.

Consequence

The consequence of the impact is considered as moderate for the unmitigated scenario and low for the mitigated scenario.

Probability

The impact will definitely occur (high).

Significance

The significance of the impact is rated as **moderate** for the unmitigated scenario. Management and mitigation measures are possible, and the impact can be minimized when interventions and alternative arrangements are implemented, but the significance will remain **moderate**.

Tabulated summary of the assessed impact – Physical destruction of habitats and animals

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	M	M	M	M	H	M
Mitigated	L	L	L	L	H	M

Management and mitigation measures

By re-routing of the pipeline to a shorter route (see Figure 7) and the relocation of the northern pump station, some impacts can be minimized See also Section 8.1.1.

Sensitive areas and areas of particular concern should be avoided where possible and require specific mitigation measures otherwise. Specific recommendations include:

- Sensitive areas such as washes and rivers should be avoided as they sustain riverine vegetation, provides connectedness in the landscape and functions as a source of (albeit seasonal) water.

- Habitats where organisms occur in concentrated communities (e.g., rupicolous, burrowing, slow-moving and small species or roosting and nesting birds, dense stands of protected plant species, e.g., aloes) should be avoided and alternative routes preferred.
- Isolated habitats, habitats occupied by specialized organisms, and habitats sustaining landscape connectedness should be avoided and alternative routes preferred.
- Cutting into rocky outcrops should be avoided and alternative routes preferred.
- Where rocky outcrops are destroyed or large rocks unearthed during pump station construction or trenching, the waste rocks must be piled in suitable areas to mimic rocky outcrops. This will re-create habitat and off-set rocky habitat loss.
- Limit the distances of service and access roads.
- Demarcating the footprint can limit access outside these areas (and to protect undisturbed areas).
- Speed limits can be enforced.
- A sound restoration plan for disturbed areas can be implemented.
- Strict control and supervision during construction is required to protect undisturbed areas outside the construction zone.

8.1.4 ISSUE: POACHING, KILLING OF ANIMALS AND THE ILLEGAL COLLECTING OF ANIMALS

Agri-ecological Services (2021) states that the presence of construction and maintenance staff creates the risk for illegal activities such as poaching and the collecting and killing of animals. Poaching for food, selling of meat, killing of 'nuisance' species such as snakes and rodents, or the capturing of pets are included in these activities.

Assessment of Impact

Nature and intensity, duration of impact and geographical extent

The impact intensity is rated as low because it is controllable, and the biodiversity of the area is already compromised. The duration of the impact is expected only during the construction and is thus low (short term) and it is expected that maintenance staff will be few. The extent of the impact is moderate because the influences might be beyond the footprint area.

Consequence

The consequence of the impact is considered as low, with constant checking for the unmitigated scenario and low for the mitigated scenario.

Probability

The probability is moderate – because it is likely that people will take the opportunity when it occurs.

Significance

The significance of the impact is rated as **low** for the unmitigated scenario. In the mitigated scenario the significance of the impact is also rated as **low**.

Tabulated summary of the assessed impact – poaching, killing of animals and the illegal collecting of animals

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	L	L	M	L	M	L
Mitigated	L	L	L	L	L	L

Management and mitigation measures

- Reinforce acceptable behaviour through adequate information sharing.
- Strictly enforce all environmental rules, with special emphasis placed on preventing transgression and punishment of transgressors.
- Put in place appropriate competency and compliance training and enforcement of behaviour rules.
- Without infringing on the rights of workers, manage movements and set rules accordingly.

8.1.5 ISSUE: NOISE, DUST, LIGHT AND CHEMICAL POLLUTION

Agri-ecological Services (2021) states that noise, dust, light and chemical pollution can have an impact.

Noise can be caused by operating the pump stations. Light can attract insects and their predators.

Animals react differently to these kinds of disturbances, but it can distort assemblages and subsequently their indirect impacts on the environment. Mammals, birds, and reptiles can be displaced. The habitat quality can be compromised due to dust, light, chemical spillage or oil leaks from vehicles, machinery, and equipment.

Assessment of Impact

Nature and intensity, duration of impact and geographical extent

The impact intensity is rated as low. The duration of the impact is low, because it is temporary and the noise from the pump stations affects a very small area. The extent of the impact is low because it is confined to the disturbed areas and the surroundings only.

Consequence

The consequence of the impact is considered as low.

Probability

The probability is moderate because there is a good possibility that pollution will have negative impacts on some animals.

Significance

The significance of the impact is rated as **low** for the unmitigated scenario. In the mitigated scenario the significance of the impact is rated as **low**.

Tabulated summary of the assessed impact – Noise, dust, light and chemical pollution

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	L	L	L	L	M	L
Mitigated	L	L	L	L	L	L

Management and mitigation measures

- Machinery must be equipped with the necessary measures to minimize noise.
- Vehicles need to be regularly maintained. Maintenance programs will be established and implemented.
- Chemical and oil spills to be immediately contained and removed. Protocols and equipment for this are in place with regular checks.
- Enforce speed limits (higher speeds generated higher noise and dust levels).
- Screen lights or use insect-friendly bulbs.

8.1.6 ISSUE: REHABILITATION AND DECOMMISSIONING

Agri-ecological Services (2021) states that activities because of filling and bedding of the trenches and excavations, resurfacing and sloping of the borrow pits, the decommissioning of redundant

concrete, pipes, pump installations and reservoirs can be coupled to disturbance, interference, or degradation, despite its intention as rehabilitation interventions.

With the necessary mitigation measures in place, the significance rating can change to moderate positive, however.

Assessment of Impact

Nature and intensity, duration of impact and geographical extent

The impact intensity is rated as low. The duration of the impact is moderate because it may have longer term impacts. The extent of the impact is moderate, because of the size of the area implied.

Consequence

The consequence of the impact is considered as low.

Probability

The probability is moderate because there is a good possibility that negative impacts will occur.

Significance

The significance of the impact is rated as **low** for the unmitigated scenario. In the mitigated scenario the significance of the impact is rated as **low**.

Tabulated summary of the assessed impact – Rehabilitation and decommissioning

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	L	M	M	L	M	L
Mitigated	L	L	L	L	L	L

Management and mitigation measures

- Take care to prevent soil erosion, encourage herbaceous vegetation growth and prevent bush encroachment after the water pipe is installed underground.
- Aftercare is necessary as invader bushes will coppice, new seedlings will germinate, and erosion may occur. Alien invasive species may also establish. Periodic inspections and clearing are thus needed.
- Rehabilitate borrow pits through landscaping and by encouraging vegetation growth on the impacted surfaces (e.g., sowing of indigenous grass species, erosion control).
- Dispose of recyclable material (such as steel, power cables and pipelines) in the appropriate manner and recycle wherever possible.
- Keep disturbance during decommissioning to a minimum.

- Restore areas where soil was disturbed, paying attention to natural drainage networks and prevention of soil erosion.

8.1.7 ISSUE: DISTURBANCE OF BIRDS DURING CONSTRUCTION

During construction, vehicle movements and human activity along the proposed pipeline route are at a peak. During the operational phase, the amount of disturbance is expected to decrease. Results from disturbance are mainly indirect – displacement of birds and a reduction in breeding success (ACS, 2020). The specialist study identifies bird species and habitats most likely to be affected by disturbance. Habitat loss is also discussed in Section 8.1.3.

Assessment of Impact

Nature and intensity, duration of impact and geographical extent

No measurable change to natural functions and processes are foreseen, despite the possible displacement of birds. The intensity is low, thus. The impacts are local, which means that the extent of the impacts is low. The impacts are temporary or short term, which means that the duration of the impact is low.

Consequence

The consequence of the impact is considered as low for the unmitigated scenario and low for the mitigated scenario.

Probability

The probability that birds will be disturbed is most likely definite i.e. high. It is expected that mitigation measures can reduce the impacts.

Significance

The significance of the impact is rated as **moderate** for the unmitigated scenario. In the mitigated scenario the significance of the impact is rated as **low**.

Tabulated summary of the assessed impact – Disturbance of birds during construction

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	L	L	L	L	H	M
Mitigated	L	L	L	L	L	L

Management and mitigation measures

See Sections 8.1.1 and 8.1.3

8.1.8 ISSUE: COLLISION OF BIRDS WITH OVERHEAD POWERLINE

The collision of birds with overhead powerlines is a reality in Namibia. Overall, the impacts of powerline structures on avifauna and recommended mitigation measures are well documented, both globally and for the southern African subregion (ACS, 2020).

Assessment of Impact

Nature and intensity, duration of impact and geographical extent

The intensity of this impact is high since the natural ecological functions and processes are altered in such a way that they can temporarily or permanently cease. This can cause substantial deterioration of the impacted environment, specifically avifauna. This is particularly true for the identified species at risk.

The extent of the impact is local, since it is confined to the powerline, i.e. within the project corridor. However, the impact contributes regionally, if species numbers become at risk. Bird mortalities are medium to long term but can be reversed over the duration of the project.

Consequence

The consequence of the impact is considered as moderate to high for the unmitigated scenario and moderate to low for the mitigated scenario.

Probability

The probability that birds will collide with the proposed powerline and related structures is most likely definite, i.e. high – even with mitigation measures in place. It is expected that mitigation measures can reduce the incidents of collision.

Significance

The significance of the impact is rated as **moderate to high** for the unmitigated scenario. In the mitigated scenario the significance of the impact is rated as **moderate to low**. This means that the impact of potential collisions, specifically for species at risk, needs to be considered. The powerline should incorporate bird diverters at positions recommended by the specialist; without which the powerline will likely have unwanted consequences on red data bird species in Namibia.

Tabulated summary of the assessed impact – Collision of birds with overhead powerline

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	H	M	L*	M-H	H	M-H
Mitigated	M	M	L	L-M	M	L-M

* Although impact on species will have a regional impact

Management and mitigation measures

- It is likely that the selected route will cause a visual barrier, and this barrier will likely act as mitigation to reduce bird mortalities.
- In addition, bird diverters can be attached to the conductors – especially where the powerline crosses identified habitats and flightpaths such as drainage lines.
- Monitoring is recommended to track bird mortalities and the effectiveness of the mitigation measures (as suggested by ACS, 2020).

8.1.9 ISSUE: ELECTROCUTION OF BIRDS ON OVERHEAD POWERLINE

Like collision of birds with overhead powerlines, the electrocution of birds on overhead powerlines is a reality in Namibia. Electrocutions can result in injuries or mortalities (ACS, 2020).

Assessment of Impact***Nature and intensity, duration of impact and geographical extent***

The intensity of this impact is moderate, since the natural ecological functions and processes can continue, but in a modified way. Discomfort is possible, particularly for the identified species at risk.

The extent of the impact is local, since it is confined to the powerline, i.e. within the project corridor and thus low. The duration of the impact is moderate, as the impacts are in the medium term and reversible.

Consequence

The consequence of the impact is considered as moderate to high for the unmitigated scenario and moderate to low for the mitigated scenario.

Probability

The probability that birds can be electrocuted is most likely, i.e. moderate to high. It is expected that mitigation measures can reduce the impact to low.

Significance

The significance of the impact is rated as **moderate to high** for the unmitigated scenario, as it cannot be avoided unless it is mitigated. In the mitigated scenario the significance of the impact is rated as **low**. This means that the impact of potential electrocutions, specifically for species at risk, needs to be considered.

Tabulated summary of the assessed impact – Electrocution of birds on overhead powerline

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	M	M	L	M-H	M-H	M-H
Mitigated	L	L	L	L-M	L	L

Management and mitigation measures

- The selected route will likely cause a visual barrier, and this barrier will likely act as mitigation to reduce bird mortalities.
- In addition, bird diverters can be attached to the conductors.
- Monitoring is recommended to track bird mortalities and the effectiveness of the mitigation measures (as suggested by ACS, 2020).

8.1.10 ISSUE: BIRD NESTING ON OVERHEAD POWERLINE

Bird nesting on overhead powerlines is a reality in Namibia. This may cause flashovers and even outages in some cases (ACS, 2020).

Assessment of Impact

Nature and intensity, duration of impact and geographical extent

The intensity of this impact is moderate, since the natural ecological functions and processes can continue, but in a modified way.

The extent of the impact is local, since it is confined to the powerline, i.e. within the project corridor and thus low. The duration of the impact is moderate, as the impacts are in the medium term and reversible.

Consequence

The consequence of the impact is considered as moderate for the unmitigated scenario and moderate to low for the mitigated scenario.

Probability

The probability that birds can be electrocuted is most likely, i.e. high. It is expected that mitigation measures can reduce the impact to low.

Significance

The significance of the impact is rated as **moderate to high** for the unmitigated scenario, as it cannot be avoided unless it is mitigated. In the mitigated scenario the significance of the impact is rated as **low**.

Tabulated summary of the assessed impact – Bird nesting on overhead powerline

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	M	M	L	M	H	M-H
Mitigated	L	L	L	L-M	L	L

Management and mitigation measures

No specific mitigation measures are recommended, but it can be applied subsequently – when problem sites area identified (ACS, 2020).

8.2 SOIL

Soil has been discussed in Section 6.3.

Soil will be impacted within the narrow strip where the pipeline will be located, the construction sites where the pump houses and reservoirs will be built, a few borrow pits, and within the servitude. During the construction activities temporary impacts as a result of the movements of vehicles, machinery and equipment are apparent. In the operational phase, ongoing activities will be reduced to limited vehicle and people movements as a result of continuous maintenance and inspections.

8.2.1 ISSUE: DISTURBANCE TO SOIL WITH RESULTING EROSION

In the area to be affected, topsoil is shallow but nevertheless essential to plant growth. Soil-related knock-on effects (such as erosion) can result from construction (vegetation removal, clearance and levelling, excavation, bedding and filling) and the movement of vehicles, machinery, and equipment (Curtis Consulting, 2021).

Bedding and filling material for the buried pipeline will be obtained from the trenches and excavations, or otherwise from borrow pits where it has been agreed upon with the landowners. It is foreseen that for the first 80 km, bedding material can be obtained from trenches and excavations. Material will be screened, and if suitable, be reused as much as possible. Over the last 20 km, where more hard rock excavations can be expected, material will be obtained from borrow pits.

Assessment of Impact

Nature and intensity, duration of impact and geographical extent

The impact intensity is rated as moderate because natural functions and process continue in a modified way. All the surface material within the operational area will be disturbed, rendering it prone to erosion. Destruction may also extend beyond the necessary operational area during construction. The duration of the impact is permanent (very high). The extent of the impact is low because it is localized and confined to a narrow zone. Intensity and duration can be lowered with careful supervision to ensure that the smallest area possible is disturbed, and the shorter distance is used for the pipeline.

Consequence

The consequence of the impact is considered as moderate for the unmitigated scenario and low for the mitigated scenario.

Probability

The impact will definitely occur (very high).

Significance

The significance of the impact is rated as **high** for the unmitigated scenario. Management and mitigation measures are possible, and the impact can be minimized when interventions and alternative arrangements are implemented, reducing the significance to **low**.

Tabulated summary of the assessed impact – Disturbance of soils with resulting erosion

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	M	VH	L	M	H	H
Mitigated	L	M	L	L	M	L

Management and mitigation measures

The impacts of the pipeline are best reduced by taking the shortest route for the pipeline.

- Quarrying for bedding and filling material should only be done in areas where there are no protected trees.
- The size and number of borrow pit areas need to be minimized.
- Maintain buffer zones of at least three meters around remaining protected trees.
- Limit access routes to a minimum number and distance.
- Confine large vehicles to the servitude and restrict them not to turn around randomly.
- Materials removed from the trenches for the pipeline must be placed in the servitude, where possible, until they can be deposited in their final disposal sites.
- Rehabilitation of areas affected by construction should start as soon as construction is complete, particularly borrow pits.
- A sound restoration plan for areas with disturbed soil (including areas affected by contamination) should be implemented.
- Planting of new saplings and ground cover (active revegetation) is advisable and the colonisation by indigenous herbaceous plants should be encouraged to reduce wind and water erosion. Care must be taken not to allow the establishment of alien vegetation.
- Because riverbanks and riverbeds are sensitive to disturbance, and subjected to erosion, these sites need to be stabilized after disturbance.

8.2.2 ISSUE: ESTABLISHING OF ALIEN INVASIVE SPECIES ON AREAS OF DISTURBANCE

Invasive alien plants can establish on areas of disturbance, especially where the soil has been disturbed and where leaks occur (Curtis Consulting, 2021).

Assessment of Impact

Nature and intensity, duration of impact and geographical extent

The impact intensity is rated as low. The duration of the impact is very high, because it can become an ongoing problem if not constantly checked and controlled. The extent of the impact is low because it is confined to the disturbed areas.

Consequence

The consequence of the impact is considered as moderate, with constant checking for the unmitigated scenario and low for the mitigated scenario.

Probability

The probability is high if unchecked – areas around the pump stations, reservoirs and at leaks are likely to be invaded. It may be reduced to moderate if constantly checked.

Significance

The significance of the impact is rated as **moderate** for the unmitigated scenario. In the mitigated scenario the significance of the impact is rated as **low**.

Tabulated summary of the assessed impact – Establishing of alien invasive species on areas of disturbance

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	L	VH	L	M	H	M
Mitigated	L	M	L	L	M	L

Management and mitigation measures

- Regular inspections and clearing of alien species are needed.

8.3 ARCHAEOLOGY

Archaeology has been discussed in Section 6.8.

The pipeline route traverses an area with a relatively sparse distribution of previously known archaeological / heritage sites, and a significant proportion of the pipeline route traverses rocky hillslopes that are generally devoid of archaeological remains. Although there is a generally low likelihood that unknown heritage sites are uncovered, it is possible that buried archaeological remains, including graves, may be found during earthworks (Kinahan, 2020).

On the sandy plains east of Rehoboth several archaeological sites occur and most of these are associated with the ephemeral pans present in this area. The sites are generally well preserved, but no archaeological sites were found within the road corridor or in the areas adjacent to the road corridor through this part. (Kinahan, 2020)

Should activities related to the pipeline encroach hitherto unknown archaeological sites, the nature and intensity of impacts is expected to be negative and high. Hidden and buried sites might be exposed as the project proceeds. These potential impacts can seriously compromise the heritage of the area, and since damage to these sites is essentially irreparable, the consequences

of such impacts must be considered as permanent. The extent of these impacts will be low, or local, their duration very high or permanent, but the probability very low (Kinahan, 2020).

It is recommended that a Chance Finds Procedure is adopted (Kinahan, 2021), as indicated in the Heritage Specialist Reports (See Appendix I) and the mitigation measures contained in the EMP. Important, the precautionary principle must be applied throughout – team members should be given training to know what heritage resources they may encounter and what to do in case a discovery is made.

8.3.1 ISSUE: DISTURBANCE AND DAMAGE TO HERITAGE SITES

It is possible that activities related to the pipeline may encroach hitherto unknown archaeological sites and this assessment is based on this uncertain scenario.

Assessment of Impact

Nature and intensity, duration of impact and geographical extent

The impact intensity could be high, and the duration of the impact could be very high, because it is permanent. The extent of the impact is low because it is confined to localities only. However, since the significance is low and the footprint of the project limited and of a local extent, the rating is low.

Consequence

The consequence of the potential impacts can seriously compromise the heritage of the area, and because damage to these sites is essentially irreparable, the consequences of such impacts are considered as permanent (high). However, due to the low possibility, the rating is low.

Probability

The probability is low, and it is unlikely to occur.

Significance

The significance of the impact is rated as **low** for the unmitigated scenario. In the mitigated scenario the significance of the impact is rated as **low**.

Tabulated summary of the assessed impact – Disturbance and damage to heritage sites

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	L	L	L	L	L	L
Mitigated	L	L	L	L	L	L

Management and mitigation measures

- It is recommended that a Chance Finds Procedure is adopted and implemented.
- The precautionary principle must be applied throughout – team members should be given training to know what heritage resources they may encounter and what to do in case a discovery is made. In addition, the landowners need to be consulted about the possibility of present graves on their properties.

8.4 VISUAL

With reference to Section 6.3, the visual resources of the area can be rated as having a moderate to high quality, with the topography of the larger landscape being undulating, interspersed with plains. Sandy plains cover the largest parts of the western and southern parts.

Rehoboth and the landscape immediately east of the town is part of the southern Kalahari, a landscape which is predominantly sandy, with endoreic drainage systems such as pans and dry riverbeds. Towards the southeast the landscape is increasingly dominated by linear parallel dunes covered with permanent vegetation. East of Rehoboth the landscape flattens increasingly. Over the first stretches there are more koppies, but to the east the koppies become more scattered and isolated. Elevations gradually dip towards the valley of the Skaap River in the east.

Sensitive receptors include the identified farm homesteads. The users of the D1249 gravel road are also receptors, but the distance of the line is limited, therefore exposure to the line will be for a short period.

8.4.1 ISSUE: REDUCED VISUAL RESOURCES FOR SENSITIVE RECEPTORS RELATING TO THE 33 kV OVERHEAD POWERLINE, RESERVOIRS AND PUMP STATIONS

Assessment of Impact

Nature and intensity, duration of impact and geographical extent

Visual resources namely vistas will be reduced in their quality and scope for the duration of the project lifetime, and this influences the users on the farms and those using the D1249 gravel road (local extent). Visual resources will remain but are modified, therefore the nature and intensity are rated as moderate.

Consequence

The determining consequence can thus be considered moderate for the unmitigated scenario and moderate to low for the mitigated scenario.

Probability

The probability of the impact occurring is definite and since mitigation is limited it will remain definite with mitigation being implemented.

Significance

The significance of the impact is thus rated as **moderate** for the unmitigated scenario and **moderate to low** for the mitigated scenario.

Tabulated summary of the assessed impact – Reduced visual resources for sensitive receptors including residents, recreational users and road users

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	M	M	L	M	H	M
Mitigated	M	M	L	L-M	H	L-M

Management and mitigation measures

- Continuous rehabilitation of disturbed areas after construction activities.
- Reservoirs and pump station structures (colours) should blend in with the surroundings.
- Restrict the extent of work areas.
- Consult farm owners as to the best laydown areas that will be out of sight.
- Keep work areas tidy and implement the waste management plan daily.

8.5 CUMULATIVE IMPACTS

- In addition to the proposed new 33 kV powerline, several overhead powerlines already exist in the larger landscape. Collisions of birds with these powerlines is therefore a major concern in the wider landscape, with possible regional consequences.
- The physical destruction of habitats and the loss of species because of land clearance for the proposed pipeline (and powerline) in combination with the mine site implies an amplified effect on biodiversity. The larger landscape is marked with modified habitats and impacts because of livestock and game farming, altogether resulting deterioration of the landscape ecology and the connectedness of ecosystems.
- Although the larger landscape is considered of low archaeological importance, implementation of precautionary principles and a Chance Find Procedure will ensure that the potential impact significance remains within acceptable levels.
- Several socio-economic cumulative impacts could be identified – these are discussed in the EIA amendment report (Namisun, 2020).

9 CONCLUSIONS AND RECOMMENDATIONS

The environmental aspects and potential impacts relating to the proposed construction of the bulk water supply water pipeline and associated 33 kV powerline along a section of the pipeline have been successfully identified and assessed. The results of this impact assessment present the potential for negative environmental impacts that can all be mitigated to acceptable levels, by implementing the EMP.

Namisun believes that a thorough assessment of the potential impacts associated with the proposed construction of the bulk water supply pipeline and associated powerline has been achieved and will ensure MEFT to make an informed decision regarding the issuing of an ECC. It is recommended that, if MEFT provides a positive decision on the application for the proposed project, they should include a condition to the clearance that Lodestone must implement all commitments in the EMPs.

The way forward is as follows:

- I&APs review the report and send their comments to Namisun by 18 September 2023.
- Namisun finalize report, incorporating I&APs' comments.
- Submission of the final report (including I&APs' comments) to MAWLR and MEFT for their review and decision.

10 REFERENCES

- African Conservation Services, 2020.** EIA Amendment for Lodestone's Dordabis Iron Ore Mining Project and Associated Infrastructure. Construction of new 132 kV and 33 kV overhead powerlines. Avifauna baseline / scoping and assessment. Unpublished report for Namisun.
- Agri-ecological Services, 2021.** Assessment of environmental impacts on reptiles, birds and mammals by the proposed water pipeline for Lodestone's Dordabis Iron Ore Mine. Unpublished report for Namisun.
- Airshed, 2020.** Lodestone's Dordabis Iron Ore Mining Project: Air quality baseline assessment. Unpublished report for Namisun.
- Christelis, G. and Struckmeier, W. (Eds.) 2001.** Groundwater in Namibia – an explanation to the hydrogeological map. Ministry of Agriculture, Water and Rural Development (Department of Water Affairs), Windhoek, Namibia.
- Christian, C. 2019.** Report for renewal of environmental clearance on ML 182, Phase 1.
- Colin Christian & Associates CC, 2013.** Lodestone Namibia (Pty) Ltd: Proposed Dordabis Iron Mine, Phase 1 (EPL 3112) EIA and EMP.
- Curtis Consulting, 2021.** EIA amendment for Lodestone's Dordabis Iron Ore Mining Project and associated infrastructure - pipeline route from Oanob Dam to the mine: Vegetation Survey. Unpublished report for Namisun.
- De Klerk, J. N. 2004.** Bush encroachment in Namibia. Ministry of Environment and Tourism (Department of Environmental Affairs), Windhoek, Namibia.
- Enviro Dynamics, 2020.** EIA update of the proposed 400kV transmission line from Kokerboom Substation to Auas Substation. Windhoek.
- Government of the Republic of Namibia (GRN) 2008.** Draft procedures and guidelines for environmental impact assessment and environmental management plan. Ministry of Environment and Tourism, Windhoek, Namibia.
- Kinahan, J. 2021.** Archaeological specialist study for the water supply pipeline route Oanob to Lodestone Mine. Unpublished report for Namisun.
- Mendelsohn J., Jarvis A., Roberts C. and Robertson T. 2002.** Atlas of Namibia. A portrait of the land and its people. David Philip Publishers, Cape Town, RSA.
- Namisun. 2020.** EIA Amendment Report and EMP for the proposed changes to the Dordabis Iron Ore Mining Project and associated infrastructure and a proposed new 132 kV powerline to the mine.
- Schneider, G. 2004.** The roadside geology of Namibia. Sammlung Geologischer Führer 97, Gebr. Borntraeger, Berlin.

APPENDIX A: CURRICULUM VITAE OF EAPS

APPENDIX B: STAKEHOLDER DATABASE FOR THE PROPOSED WATER PIPELINE

APPENDIX C: BID, SITE NOTICES, ADVERTISEMENTS, COMMUNICATIONS, AND INTERACTIONS WITH STAKEHOLDERS

APPENDIX D: ISSUES AND RESPONSES REPORT

APPENDIX E: SPECIALIST REPORT - VEGETATION SURVEY AND ASSESSMENT

APPENDIX F: SPECIALIST REPORT - REPTILES, BIRDS AND MAMMALS SURVEY AND ASSESSMENT

APPENDIX G: SPECIALIST REPORT - ARCHAEOLOGICAL SURVEY AND ASSESSMENT

APPENDIX H: SPECIALIST REPORT - BIRD SURVEY AND ASSESSMENT RELATING TO THE POWERLINE