DRAFT

ENVIRONMENTAL PRE-FEASIBILITY SCOPING STUDY AND TERMS OF REFERENCE REPORT

CES

ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

NATAKA HEAVY MINERALS DEPOSIT, NAMPULA PROVINCE, MOZAMBIQUE

Environmental Pre-Feasibility Scoping Study and Terms of Reference Report

Prepared for:

Kenmare Moma Mining (Mauritius) Limited and Kenmare Moma Processing (Mauritius) Limited
Av. Marginal 4985, Prédio Zen, 4º Andar Esq.Maputo
Mozambique

Prepared by:

Coastal and Environmental Services (Pty) Ltd. t/a CES

www.cesnet.co.za

MAY 2022

Original report drafted in English and translated to Portuguese

REVISIONS TRACKING TABLE

CES Report Revision and Tracking Schedule

Document Title:	Environmental Pre-Feasibility Scoping Study and Terms of Reference for the proposed Nataka Heavy Minerals Deposit, Nampula Province, Mozambique		
Client Name and Address:	Kenmare Moma Mining (Mauritius) Limited and Kenmare Moma Processing (Mauritius) Limited, Av. Marginal 4985, Prédio Zen, 4º Andrar Esq., Maputo, Mozambique		
Status:	Draft		
Issue Date:	July 2022		
Lead Author:	Ms Nicole Wienand Dr Chantel Bezuidenhout Ms Lina Buque		
Reviewer:			
Study Leader/ Registered Environmental Assessment Practitioner – Approval:	Dr A.M (Ted) Avis		
Report Distribution	Circulated to	No. of hard copies	No. electronic copies
	Lara Horne	0	1
Report Version	Date		
	July 2022		

www.cesnet.co.za

NON-TECHNICAL SUMMARY

INTRODUCTION AND BACKGROUND

The heavy mineral ore bodies of Namalope and Pilivili, located in the Nampula Province, north-eastern Mozambique are currently being mined by Kenmare Moma Mining (Mauritius) Limited and Kenmare Moma Processing (Mauritius) Limited (collectively referred to as “Kenmare”). These ore bodies are a finite resource and mining at the Namalope deposit is forecast to be completed by 2025. Kenmare therefore need to relocate the existing mining operations to the Nataka deposit, which is a proven resource. The Nataka deposit is located approximately 8 km south-west of Namalope, within Kenmare’s existing concession. The relocation of the mining operations is required to ensure that the provision of feedstock to maintain the current production rate of 1.2 million tonnes of ilmenite plus the co-products zircon and rutile can continue.

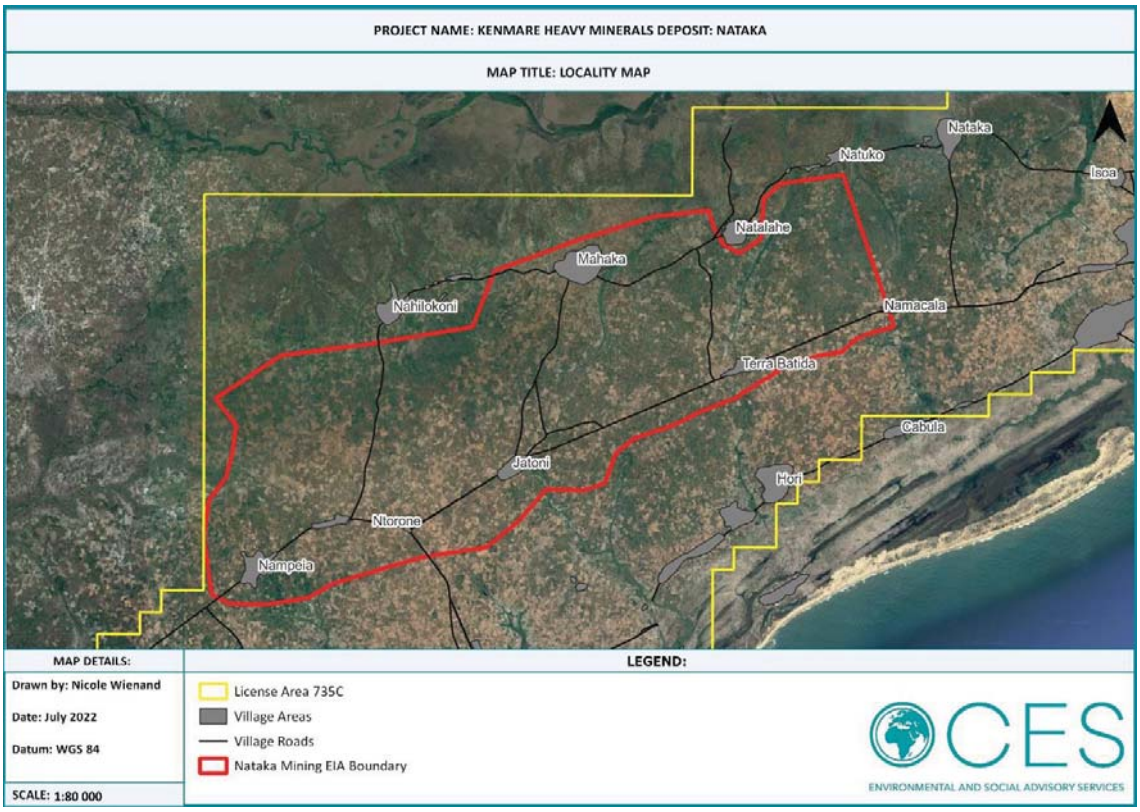


Figure 1: Locality Map

PROJECT DECRIPTION

Mining will involve site clearance, dredge, hydraulic and dry mining, separation of the minerals, sand and fine material, management of the tailings and progressive rehabilitation of the mined areas. Further processing, storage and shipping of the products will take place at the current operations. The aspects assessed in this ESHIA include site preparation (construction phase), the mining and separation of the resource at the Nataka site and the transportation of the heavy mineral concentrate (via pipeline) for further processing at the existing operations at Namalope (operational phase).

The following infrastructure will be associated with the proposed development:

- An in-path Tailings Storage Facility (TSF) and associated berms.
- Roads to enable access to various parts of the development and for transportation of materials, equipment, supplies and employees - Access roads will be constructed of material obtained from approved borrow pits. Existing public roads will be used as far as possible.
- A lay-down area for construction materials and equipment.
- Workshops for repair of equipment and machinery.
- Bunded storage areas for diesel fuel, lubricants, and waste oil.
- Stores and a lay-down area(s) for equipment, spares and consumables.
- Offices for site staff.
- Ablution facilities and associated sewage treatment plant.
- Boreholes for the supply of potable and operational water.
- Pipelines for supplying additional potable and operational makeup water.
- Process water reservoirs.
- Security measures.
- Electrical infrastructure – Overhead Line (OHL), substations.
- Road and/or pipeline for transportation of Heavy Mineral Concentrate (HMC) to the MSP.
- An Eastern Infrastructure Terrace which will include a HMC Positive Displacement (PD) pumping station (3 PD pumps with one pipeline), a slimes PD pump to transfer slimes to the Isoa Valley TSF (5 PD pumps with one pipeline), a raw water dam, fixed thickeners and flocculant plant (3 x 65m diameter thickeners), Heavy Machinery Equipment (HME) Workshop, Stores, Offices and Ablutions, Wash Bay, Sand Trap, Oil Separator and Water Tanks, Process water dam, HMC Stacker, Reclaim Conveyor and bin discard with reclaim ramp, and a High Voltage (HV) Yard and substation. Depending on detailed planning it is possible that more than one Eastern Infrastructure Terrace will be required. If this is the case, a second Infrastructure Terrace will need to be constructed and the original infrastructure terrace decommissioned and rehabilitated.
- Western Infrastructure Terrace which will include HMC PD pumping station (3 PD pumps with one pipeline, as the eastern terrace PD pumps will remain in operation and will be used as boosters), slimes PD pumps to transfer slimes to the in-path Valley TSF (8 PD pumps with two pipelines, to accommodate the higher volume of slimes in the western part of the orebody). It is likely that the PD pumps will be relocated from the eastern to the western terrace. During this relocation period slimes will be pumped directly to the in-path TSF while the Wet Concentrator Plant (WCP-A) is still close to the in-path TSF. Other infrastructure includes a raw water dam, fixed thickeners and flocculant plant (4 x 65m diameter thickeners), process water dam, HMC Stacker, Reclaim Conveyor and bin discard with reclaim ramp and a substation.
- Several pipeline routes will be required as follows:
    - HMC pipeline from the infrastructure terrace to the MSP.
    - Surface water abstraction pipeline.
    - Water pipeline from the infrastructure terrace to the WCP-A pond.
    - Slimes pipeline from the infrastructure terrace to the TSF.
    - Water return pipeline from the TSF to the infrastructure terrace.
    - For the floating feed-well option:
        - ❖ Thickener feed pipeline from WCP-A to the infrastructure terrace.

- ❖ Process water pipeline from infrastructure terrace to the WCP-A pond.

- For the fixed thickener option:
  - Slimes transfer pipeline from WCP-A floating feed-well to the PD pumping station at the infrastructure terrace

The exact position and size of this infrastructure is not currently defined and will depend on the outcome of the environmental assessment and associated technical studies currently being undertaken by Kenmare.

MOTIVATION

The heavy mineral ore bodies of Namalope and Pilivili, located in the Nampula Province currently being mined by Kenmare are a finite resource and will be mined out in the next 5 to 7 years. Kenmare therefore need to relocate the existing mining operations to the Nataka deposit, which is located approximately 8 km south-west of Namalope, within Kenmare's existing concession. The relocation of the mining operations is required to ensure that the provision of feedstock to maintain the current production rate of 1.2 million tonnes of ilmenite plus the co-products zircon and rutile can continue.

Mozambique is a developing country in southern Africa that has been steadily rebuilding its economy, civic institutions and social infrastructure since ending a 16-year civil war in 1992. Despite the impressive economic growth over the past decade, and the forecasts for continued economic growth, Mozambique still faces some significant challenges. It ranks 181 out of 189 countries on the 2019 UNDP Human Development Index and approximately 60% of the population of 23.7 million live on less than USD1.25/day. This puts the country in the low human development category.

Mozambique is experiencing a period of economic growth due to recent discoveries of predominantly gas, coal, rubies and graphite. It is envisaged, and hoped by many, that this growth will be achieved in a manner which is beneficial to all of Mozambique's citizens and will permanently elevate the country from being amongst the World's poorest. The principal driver by which this growth is to be achieved is through foreign direct investment into the resources and mineral sector.

The expansion of the Kenmare operations to the Nataka site will assist Kenmare to continue employing local people and Mozambique nationals, as operations will continue, and mine closure would not be required. In addition, the construction phase of the proposed project will also result in a limited number of additional employment opportunities within the general project area. The proposed development will also ensure Kenmare is able to continue with its current levels of tax payments and will continue to implement various Corporate Social Responsibility projects to uplift the project affected communities.

ALTERNATIVES

A different type of development: Since the core business of the project developer is mining and as the surrounding areas are already being utilised for this purpose, the fundamental alternative of a development other than mining is technically not feasible in this instance. For this reason, no fundamental alternative to the proposed development will be considered.

A different location: It is not possible to locate the proposed mining area in a different location, as the specific area has been selected based on suitable mineral grades that occur in sufficient quantity too allow for commercial exploitation. Alternative areas within the general project area have already been mined or might be mined in the future. Consequently, a different location is not a viable alternative and cannot be assessed.

Design: Several design alternatives have been assessed as part of a pre-feasibility study completed for the proposed project. These include the following:

Mining Method: Kenmare assessed the following mining methods: dredge mining, bucket wheel excavator mining, hydraulic mining, dry mining via front end loaders and dry mining via dozers. The preferred mining method consists of a combination of dredge mining, hydraulic mining and dry mining via the use of dozers. This option will be assessed further in the ESHIA.

Tailings and Slimes Management: The two primary options for slimes deposition considered were continuous slimes paddocks in the mine path, and long term TSFs. Test work indicated that the Nataka slimes consolidate at a very slow rate. Dedicated TSFs for slimes were therefore recommended over in-path paddock deposition. However, in some specific situations in-path paddocks may still be required, for example when mining in particularly high slimes areas. As such both options as well as a combination of these options will be assessed further in the ESHIA.

Layout: For mining projects layout alternatives are very limited, as the location of the mine is determined by the presence of the resource to be exploited. Thus, the layout of the mining path is based on geological exploration, which is used to define the extent of a commercially exploitable resource. The presence of the minerals therefore dictates the layout of the mine path. Further layout options might include for example the location of access roads and other associated infrastructure. Alternative layout options will be explored in the ESIA.

No-Go: According to the ESHIA Regulations, the option of doing nothing, not proceeding with the proposed development (i.e. the No Go Option), must be assessed during the ESHIA.

ECOLOGICAL SENSITIVITY

Hydrology:

The Nataka project area includes several tertiary tributaries that flow into one of the two main secondary tributaries of the Larde River. These linear drainage features mainly slope from south to north and drain the site into the Larde floodplain. In the southern extent there is an isolated drainage line that flows seaward. The floodplain of the Rio Larde is a major geomorphic feature to the north but falls outside the boundary of the deposit area.

There are several wetland systems within the project area. Although a number of these wetlands have been impacted by vegetation clearing largely for agricultural purposes, they still support considerable biodiversity and provide a range of valuable ecosystem services such as water supply for domestic use (washing and drinking) and subsistence agriculture.

Vegetation:

The vegetation present within the study area is a mosaic of Miombo Woodland and transformed land which is comprised of machambas. Due to the past and present shifting cultivation practices a mosaic of vegetation types occur. A vegetation classification has not been done at this stage, but based on a preliminary field visit the following communities were identified:

- Secondary savannah – most abundant
- Miombo woodland/thicket – isolated patches
- Vegetation of drainage lines – restricted to drainage lines
- Floodplain grassland – restricted to the Larde floodplain area.

Fauna:

During the brief dry season screening survey undertaken in 2021, four reptiles, three amphibians, three mammals and 44 bird species were recorded. Two SCC were observed on site; the Martial Eagle (EN) and the Pallid Harrier (NT). Species that need further investigation in the ESHIA include confirmation of the presence of the Mole-rat species, the Zambezi Flapshell Terrapin (*Cycloderma frenatum*) (EN), the Temminck's Pangolin (*Smutsia temminckii*) (VU) and several vulnerable bird species. A faunal assessment will be conducted as part of the ESHIA process.

Protected Areas:

There are fifty-eight (58) protected areas in Mozambique, covering a total land surface area of 233,249 km^2 (Integrated Biodiversity Assessment Tool - IBAT). A portion of the project area falls within the Primeiras and Segundas Environmental Protection Area (APAIPS), one of the largest protected marine areas in Africa with a marine reserve of approximately 10,411 km^2. The APAIPS includes 10 islands, the strip of ocean between these islands and the shore, as well as several estuaries and rivers within the 19.3 km stretch inland.

The management of Conservation Areas in Mozambique is primarily the responsibility of the National Conservation Administration (ANAC). However, management of the APAIPS is based on a participatory approach and incorporates government, communities, private sector, civil society and others (Biofund, 2022). The Management Plan for the APAIPS (Plano de Maneio da Área de Protecção Ambiental do Arquipélago das Ilhas Primeiras e Segundas 2014-2019) provides guidance on specific activities within the protected area to minimise threats to biodiversity and identifies various zones within the Environmental Protection Area with different levels of environmental protection. The document indicates that there are several approved mine concession areas within the designated area and includes specific guidance on how such activities should be managed.

Other than the APAIPS, the nearest protected area in proximity to the project area is the Gile Game Reserve, located approximately 53 km north-west of the project area.

SOCIAL SENSITIVITY

Eight villages are located within and directly adjacent to the project's boundaries and access routes. The villages are:

- Nampeia
- Nahilokoni
- Mahaka
- Natalahe
- Natuko
- Nataka
- Terra Batida
- Jatoni

These villages will all be directly affected by the project and are referred to as project affected communities (PAC).

RISKS IDENTIFIED

A total of twenty-seven (27) potential risks were identified for the proposed project. Of these twenty-seven potential risks, ten (10) were classified as being of high negative significance, thirteen (13) were classified as being of moderate negative significance and one (1) was classified as low negative significance prior to mitigation. Additionally, two (2) were classified as high positive and one (1) as moderate positive (see table below). In terms of risks, with the implementation of sound mitigation measures, most of the potential risks identified can be reduced to minor or medium. However, six (6) risks were classified as major, and it is these risks that require careful consideration during the ESHIA phase. Three of these risks are biophysical in nature, and relate to impacts on groundwater quantity and quality, disturbance to drainage lines and the Larde River, and impacts of mining on soil productivity. The remaining four are social risks relating to in-migration, impacts related to disrupting community access routes, risks associated with involuntary resettlement, and loss of land and access to resources.

Issue	Significance Rating	Mitigation Potential	Anticipated Risk
PS 2 – Labour and Working Conditions			
National and Regional Benefits	**Moderate (+)**	Easily Achievable	**Minor**
Creation of Employment	**High (+)**	Easily Achievable	**Minor**
Working Conditions	**Low (-)**	Achievable	**Minor**
Occupational Health and Safety	**Moderate (-)**	Difficult	**Medium**
Social Development	**High (+)**	Easily Achievable	**Minor**

Issue	Significance Rating	Mitigation Potential	Anticipated Risk
In-migration	**Moderate (-)**	Very Difficult	**Major**
PS 3 - Pollution Prevention and Abatement			
General and Hazardous Waste	**Moderate (-)**	Achievable	**Minor**
Surface water and stormwater contamination	**Moderate (-)**	Easily Achievable	**Minor**
Water Use	**High (-)**	Easily Achievable	**Minor**
Groundwater Quantity	**Moderate (-)**	Very Difficult	**Major**
Groundwater Quality	**Moderate (-)**	Achievable	**Minor**
Noise	**Moderate (-)**	Achievable	**Minor**
Air Quality	**Moderate (-)**	Achievable	**Minor**
Energy Use	**Moderate (-)**	Achievable	**Minor**
Landscape and Visual Quality	**Moderate (-)**	Achievable	**Minor**
PS 4 – Community Health, Safety and Security			
Access	**High (-)**	**Difficult**	**Medium**
Safety	**High (-)**	**Achievable**	**Medium**
Traffic Impacts	**High (-)**	**Achievable**	**Medium**
Community Health and communicable disease	**High (-)**	**Achievable**	**Medium**
PS 5 – Land Acquisition and Involuntary Resettlement			
Resettlement	**High (-)**	**Difficult**	**Major**
Loss of land and access to resources	**High (-)**	**Difficult**	**Major**
Changes to social systems and structures	**High (-)**	**Achievable**	**Medium**
PS 6 – Biodiversity Conservation and Sustainable Natural Resource Management			
Loss of vegetation and biodiversity	**Moderate (-)**	**Difficult**	**Medium**

Issue	Significance Rating	Mitigation Potential	Anticipated Risk
Habitat fragmentation and loss of fauna	**Moderate (-)**	**Difficult**	**Medium**
Disturbance to drainage lines and the Larde River	**High (-)**	**Difficult**	**Major**
Impacts of mining on soil productivity	**High (-)**	**Difficult**	**Major**
PS 8 – Cultural Heritage			
Graves	**Moderate (-)**	**Achievable**	**Minor**

WAY FORWARD

Specialist studies (including field surveys) will be completed within the study area. However. The existing information available for the broader area will be used to contextualise the site and any issues such as Species of Conservation Concern (SCC) that might be identified.

The following specialist studies will be undertaken to supplement and inform the ESHIA:

1. Vegetation Assessment
2. Terrestrial Faunal Assessment
3. Soils, Land and Natural Resource Use and Agriculture
4. Groundwater Assessment
5. Surface Water Assessment (including baseline survey)
6. Wetland Assessment
7. Socio-economic Impact Assessment including Cultural and Heritage Assessment
8. Health Impact Assessment
9. Radiation Assessment
10. Waste Management Assessment
11. Air Quality Assessment (including baseline)
12. Noise Assessment (including baseline)
13. Rehabilitation Strategy
14. Materials handling, Infrastructure and Transport Assessment

Upon completion of the specialist studies, a Draft ESHIA and a Draft Environmental & Social Management Plan will be compiled and the information contained therein will be circulated to all stakeholders for comment prior to submission of these reports to the authorities for decision making purposes.

TABLE OF CONTENTS

1 INTRODUCTION 2

1.1 Project Overview 2
1.2 Environmental Permitting Process 2
1.3 The Proponent and Consulting Company 4
1.4 Expertise of Key Team Members 4
1.5 The ESIA Process in Mozambique 6
1.6 Applicable Mozambican Legislation 10
1.7 Applicable International Legislation 17
1.7.1 The Equator Principals 17
1.7.2 International Finance Corporation Performance Standards 21
1.7.3 IFC Environmental, Health and Safety General Guidelines 23
1.7.4 IFC EHS Guidelines for Mining 24
1.7.5 The African Development Bank Environmental Guidelines for Mining Projects (June 1995) 24
1.7.6 World Bank Environment, Health and Safety Guidelines for Mining and Milling – Open pit 24
1.7.7 World Health Organisation Guidelines for Drinking Water Quality (2011) 25
1.7.8 International Conventions 25
1.7.9 International Labour Organization 26

2 PROJECT DESCRIPTION 27

2.1 Introduction and Project Background 27
2.2 Dredge Mining 28
2.2.1 Site Clearance 28
2.2.2 Mining and Processing 29
2.3 Dozer Trap Mining 31
2.4 Hydraulic Mining 32
2.5 In-path Tailings Storage Facility 32
2.6 Rehabilitation 34
2.7 Project Inputs and Outputs 34
2.7.1 Water Supply 34
2.7.2 Energy Requirements 34

2.7.3 Pipeline for the pumping of HMC to the existing Namalope MSP 35
2.7.4 Employment Opportunities 35
2.8 Rationale for this Development 35
2.9 Project Alternatives 36
2.9.1 Fundamental Alternatives 36
2.9.2 Incremental Alternatives 36
2.9.3 No-Go Alternative 39
3 DESCRIPTIONS OF THE BIOPHYSICAL ENVIRONMENT 40
3.1 Climate 40
3.2 Topography 40
3.3 Geology and Soils 41
3.4 Hydrology 42
3.5 Land Use 45
3.6 Vegetation 46
3.7 Fauna 49
3.7.1 Herpetofauna 49
3.7.2 Mammals 50
3.7.3 Birds 53
3.8 Protected Areas 54
4 DESCRIPTION OF THE SOCIO-ECONOMIC ENVIRONMENT 55
4.1 Local Administration 55
4.2 Project Affected Communities 55
4.3 Demographics 56
4.4 Household livelihoods, income and expenditure 56
4.5 Education 58
4.6 Agriculture 59
4.7 Graves 59
5 STAKEHOLDER AND COMMUNITY ENGAGEMENT PROCESS 60
5.1 Introduction 60
5.2 National Legislation 60
5.3 Public Participation Process 61
6 PRELIMINARY ENVIRONMENTAL AND SOCIAL RISK ASSESSMENT 62
6.1 Risk Assessment Methodology 62

6.2 Risk Assessment 64

7 TERMS OF REFERENCE FOR SPECIALIST STUDIES 75

7.1 Specialist Studies required as part of the project 75

7.1.1 Vegetation Assessment 75

7.1.2 Faunal Assessment 76

7.1.3 Soils, Agriculture, Land Use and Natural Resource Use Assessment 77

7.1.4 Groundwater and Surface Water Assessment 78

7.1.5 Wetland Assessment 78

7.1.6 Socio-economic Assessment 80

7.1.7 Cultural and Heritage Assessment 81

7.1.8 Health Impact Assessment 81

7.1.9 Radiation Impact Assessment 82

7.1.10 Waste Management Study 83

7.1.11 Air Quality Assessment (including baseline) 83

7.1.12 Materials handling, infrastructure, and Transport Assessment 84

7.1.13 Noise Impact Assessment 85

7.1.14 Rehabilitation Strategy 85

8 CONCLUSIONS AND WAY FORWARD 86

8.1 Conclusions 86

8.2 Way Forward 87

9 REFERENCES 89

APPENDIX 1 – CATEGORISATION LETTER 91

APPENDIX 2: CES MTA CERTIFICATE 92

LIST OF TABLES

Table 1.1: List of applicable national legislation 11
Table 1.2: The Equator Principles (EP III - June 2013) 17
Table 1.3: The IFC Performance Standards. 22
Table 1.4: International conventions applicable to the project. 25
Table 2.1: Maximum number of individuals that will be employed during each phase. 35
Table 3.1: Number of herpetofaunal species in Mozambique according to various sources. 49
Table 6.1: Environmental significance rating scale. 62
Table 6.2:Degree of mitigation difficulty rating scale 63

Table 6.3: Risk matrix derived from the pairing of the significance of the impact and the difficulty of mitigation. 63
Table 6.4: Risk categories. 63
Table 6.5: Summary of bio-physical and socio-economic risks in the project area. 65
Table 8.1: Summary of the potential risks associated with the project. 86

LIST OF FIGURES

Figure 1.1: Locality of the Nataka Heavy Minerals Project. 3
Figure 1.2: Summary of ESIA process to be followed for a Category A project. 7
Figure 2.1: Flow diagram illustrating the dredge mining process. 29
Figure 2.2: The rehabilitation process. 34
Figure 3.1: Gradient of the project area from north to south. 40
Figure 3.2: Gradient of the project area from west to east. 41
Figure 3.3: Hydrology of the project area of influence. 43
Figure 3.4: Preliminary vegetation map of the proposed study area. 48
Figure 4.1: Local government structure. 55
Figure 4.2: Villages identified within the project area. 57

LIST OF PLATES

Plate 2.1: View of the existing Moma Mineral Sands Wet Concentration Plant (WCP) B in the Namalope flats. 30
Plate 2.2: Aerial view of the existing Moma Mineral Sands project Mineral Separation Plant (MSP). 31
Plate 2.3: Dozer traps located side-by-side. 32
Plate 2.4: Hydraulic mining. 32
Plate 3.1: Cassava field on oxidised red sands. 42
Plate 3.2: Cassava field on hydrated yellow sands [Note drainage line in the background]. 42
Plate 3.3: Drainage line which flows north towards the Larde River Floodplain, in proximity to Mahaca Village. 44
Plate 3.4: Patches of miombo woodland found within the project site. 47
Plate 3.5: Variable Skink (*Trachylepis varia*) recorded from the project area. 50

LIST OF ACRONYMS AND ABBREVIATIONS

AfDB	African Development Bank
AfRSG	African Rhino Specialist Group
AIA	Avaliação de Impacto Ambiental or Environmental Impact Assessment
AP	Action Plan
ASL	Above Sea-Level
CBD	Convention on Biological Diver¬sity
CES	Coastal and Environmental Services
CITES	Convention on International Trade and Endangered Species of Wild Fauna and Flora
CR	Critically Endangered
DINAB	Direcção Nacional do Ambiente or National Directorate of the Environment (within the Ministry of Land and Environment)
DUAT	Direito de Uso e Aproveitamento da Terra or Right to Use and Benefit from Land (a state-granted land right)
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment (Regulations)
EMPr	Environmental Management Programme
EN	Endangered
EPDA	Estudo de Pré-viabilidade Ambiental e Definiao de Ambito or Environmental Pre-feasibility Scoping Study
EPFI	Equator Principles Financial Institutions
E & S	Environmental and Social
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Programme
ESMS	Environmental and Social Management System
FPIC	Free, Prior and Informed Consent
GDP	Gross Domestic Product
GHG	Greenhouse Gas
HIV	Human Immunodeficiency Virus
HM	Heavy Mineral
HMC	Heavy Mineral Concentrate
IBA	Important Bird Area
IBAT	Integrated Biodiversity Assessment Tool
I&AP	Interested and Affected Party
ICPC	International Cable Protection Committee
IFC	International Finance Corporation
ILO	International Labour Organisation
INE	Instituto Nacional De Estatistica
IUCN	International Union for Conservation of Nature
KM	Kilometre
KMAD	Kenmare Moma Associação de Desenvolvimento
LC	Least Concern
MSP	Mineral Separation Plant
MTA	Ministério da Terra e Ambiente or Ministry of Land and Environment
NGO	Non-Government Organisation
NT	Near-threatened
OHL	Overhead Line

PAC	Project Affected Community
PFS	Pre-Feasibility Study
PPP	Public Participation Process
PS	Performance Standards
PSEPA	Primeiras and Segundas Environmental Protection Area
RP	Resettlement Plan
SCC	Species of Conservation Concern
STD	Sexually Transmitted Disease
ToR	Terms of Reference
UN	United Nations
UNDP	United Nations Development Programme
US$	United States Dollar (currency)
VU	Vulnerable
WCP	Wet Concentration Plant
WHO	World Health Organisation

1 INTRODUCTION

1.1 PROJECT OVERVIEW

The heavy mineral ore bodies of Namalope and Pilivili, located in the Nampula Province, north-eastern Mozambique are currently being mined by Kenmare Moma Mining (Mauritius) Limited and Kenmare Moma Processing (Mauritius) Limited (collectively referred to as “Kenmare”). These ore bodies are a finite resource and mining at the Namalope deposit is forecast to be completed by 2025. Kenmare therefore need to relocate the existing mining operations to the Nataka deposit, which is a proven resource (Figure 1.1). The Nataka deposit is located approximately 8 km south-west of Namalope, within Kenmare’s existing concession. The relocation of the mining operations is required to ensure that the provision of feedstock to maintain the current production rate of 1.2 million tonnes of ilmenite plus the co-products zircon and rutile can continue.

1.2 ENVIRONMENTAL PERMITTING PROCESS

An environmental permitting process to obtain an environmental license is required for all public and private sector activities that can directly or indirectly influence the environment in Mozambique. The Nataka Heavy Minerals Project is therefore subject to a regulated Environmental and Social Impact Assessment (ESIA) process. This Estudo de Pré-viabilidade Ambiental e Definição de Âmbito (EPDA), translated as an Environmental Pre-feasibility Scoping Study, is required at the start of the EIA process, which also requires a mandatory stakeholder engagement process referred to as the Public Participation Process (PPP). This provides the opportunity for anyone with an interest in, or who may be affected by the proposed project, to become involved.

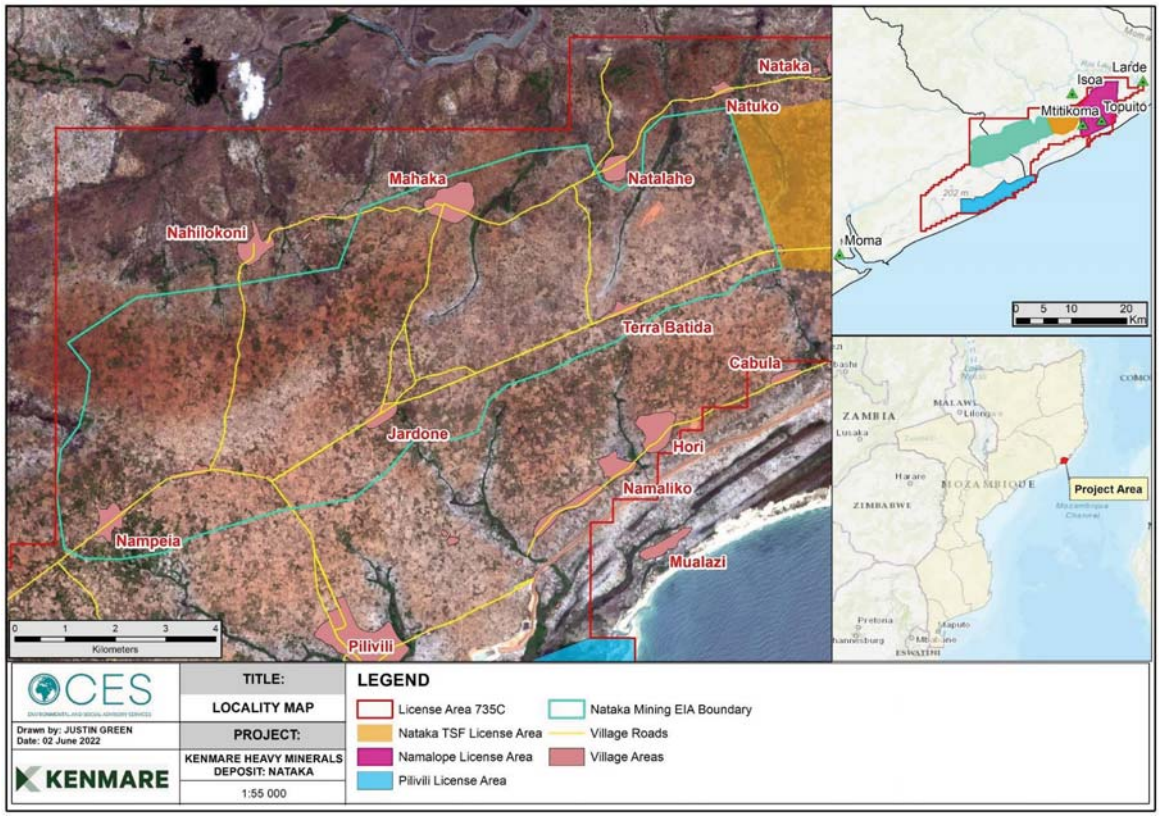


Figure 1.1: Locality of the Nataka Heavy Minerals Project.

1.3 THE PROPONENT AND CONSULTING COMPANY

The proponent for this project is Kenmare Moma Mining (Mauritius) Limited and Kenmare Moma Processing (Mauritius) Limited.

Contact details (Maputo Office):

Av. Marginal 4985,
Prédio Zen,
4º Andar Esq.,
Maputo, Mozambique.
Tele: +258 21 499 701
Fax: +258 21 499 731

The Consultants

This document has been prepared by Coastal and Environmental Services Mozambique Lda (CES). CES is a company registered in Mozambique, with the Ministério da Terra e Ambiente (MTA) (Appendix 2) and has the requisite knowledge, experience and multidisciplinary specialists to conduct environmental impact assessments and prepare environmental management programs.

The contact details for CES are:

Ms Lina Buque
Email: L.Buque@cesnet.co.za
Tel: +258 84 359 1856
Av. Patrice Lumumba No 391, 1st floor Right, Fomento Ward ,
Maputo, Moçambique

Dr Chantel Bezuidenhout
Email:c.bezuidenhout@cesnet.co.za
Tel: +27 83 320 2074
Av. Patrice Lumumba No 391, 1st floor Right, Fomento Ward ,
Maputo, Moçambique

1.4 EXPERTISE OF KEY TEAM MEMBERS

Dr A.M. (Ted) Avis – Project Leader / Reviewer

Ted Avis is a leading expert in the field of Environmental Impact Assessments, having project-managed numerous large-scale Environmental and Social Impact Assessment (ESIAs) to international standards (e.g. International Finance Corporation). Ted was principal consultant to Corridor Sands Limitada for the development of all environment aspects for the US$1billion Corridor Sands Project. Ted has also managed ESIA studies and related environmental assessments of similar scope in Kenya, Madagascar, Egypt, Malawi, Zambia and South Africa. He has also worked on large scale Strategic Environmental Assessments in South Africa and has been engaged by the International Finance Corporation (IFC) on a number of projects. Ted was instrumental in establishing the Environmental Science Department at

Rhodes University whilst a Senior lecturer in Botany, based on his experience running honours modules in ESIA practice and environment. He is an Honorary Visiting Fellow in the Department of Environmental Sciences at Rhodes. He was one of the first certified Environmental Assessment Practitioners in South Africa, gaining certification in April 2004. He has delivered papers and published in the field of ESIA, Strategic Environmental Assessment and Integrated Coastal Zone Management and has been a principal of CES since its inception in 1990, and Managing Director since 1998. Ted holds a PhD in Botany, and was awarded a bronze medal by the South African Association of Botanists for the best PhD adjudicated in that year, entitled “Coastal Dune Ecology and Management in the Eastern Cape”

Dr Chantel Bezuidenhout – Project Manager

Dr Chantel Bezuidenhout holds MSc and PhD degrees in Botany (estuarine ecology) and a BSc degree in Botany and Geography from Nelson Mandela Metropolitan University (South Africa). Dr Bezuidenhout has been an Environmental Consultant for over 10 years and as such has been focusing on environmental management and impact assessment. She is well versed in environmental legislation and has managed a number of environmental, social and health impact assessments and management plans for heavy mineral mining in South Africa and Madagascar. These projects have been completed to international standards (IFC and World Bank). In addition, Dr Bezuidenhout has also completed ESHIA’s for a number of open cast mines in Zambia and Mozambique. These projects were also completed to IFC Standards and have been granted environmental authorizations from their host countries. All the ESIAs that have been managed by Dr Bezuidenhout included community consultations and as such she has been involved in various forms of community engagements in the rural African settings. Dr Bezuidenhout has also been extensively involved in the data collection and report wring for land and natural resource use assessments in both Madagascar and Mozambique. The data gathering component involves extensive community meetings as well as focus group meetings to establish land use (including agriculture) and natural resources use within the communities and wider regions. Dr Bezuidenhout has recently completed an extensive land survey as part of a RAP process for a heavy minerals mine in Mozambique and an in-kind land survey for a large infrastructure project in Tanzania, and as such is well-versed with the relevant process. She is a Principal Consultant and Branch Manager of the CES Port Elizabeth Office.

Ms Lina Buque – Report Writer

Lina is a skilled and experienced public facilitator and socio-economic and environmental consultant with over 10 years of experience working in Mozambique. She has a Master of Environmental Science degree from the Universidade de São Paulo, Brazil. Her research area was in socio-environmental conservation and development, focusing on environmental education. Lina has experience in both environmental and social best practice performance monitoring and management. Her expertise includes project management, ESIA’s, public engagement and social facilitation, environmental compliance monitoring and resettlement planning. As a senior environmental consultant with CES, she has worked on a number of ESIA processes for the mining, forestry and oil and gas sectors, facilitating stakeholder engagement and resettlement processes, socio-economic surveys and developing Resettlement Action Plans (as per the IFC guidelines). She has completed a practical training course in Land Acquisition, Resettlement and Social Sustainability that was presented by the

World Bank. She has also gained notable experience in environmental and social performance monitoring management for the mining and oil and gas sectors to date.

Ms Nicole Wienand –Report Writer

Ms Nicole Wienand (SACNASP Reg No. 130289) is an Environmental Consultant with over 3 years' experience based in the Port Elizabeth branch. Nicole obtained her BSc Honours in Botany (Environmental Management) from Nelson Mandela University (NMU) in December 2018. She also holds a BSc Degree in Environmental Management (Cum Laude) from NMU. Nicole's honours project focused on the composition of subtidal marine benthic communities on warm temperate reefs off the coast of Port Elizabeth and for her undergraduate project she investigated dune movement in Sardinia Bay. Since her employment with CES in January 2019, Nicole has specialised in the field of ecology and botanical specialist assessments, ensuring that these specialist assessments are undertaken and prepared in accordance with the Protocols for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN R. 320), Plant Species and Animal Species (GN R. 1150). Nicole has undertaken numerous Ecological Impact Assessments for a range of developments including Wind Energy Facilities (WEFs), Overhead Lines (OHL) and infrastructure, working closely with developers to ensure a development which is environmentally sustainable as well as financially and technically feasible. ESIA Process

1.5 THE ESIA PROCESS IN MOZAMBIQUE

The ESIA [1] process, regulated by the Mozambique Environmental Impact Assessment (EIA) Regulations (Decree No. 54/2015) and translated as the Avaliação de Impacto Ambiental (AIA) Regulations, is applicable to all public and private activities. The MTA (Ministério da Terra e Ambiente or Ministry of Land and Environment), through the Direcção Nacional do Ambiente (DINAB) and translated as the National Directorate of the Environment, within the Ministry of Land and Environment, is the authority responsible for environmental assessment.

The Mozambican EIA Regulations (Article 4) define four project categories which determine the level of environmental assessment required. The project being considered here is a **Category A (Annexure II) Project** and is subject to a **full ESIA** as defined by the regulations, due to the nature, scale and location of the proposed project (Categorisation Letter N/Ref. No 612/SPA/RLA/220 received 6 June 2022, refer to Appendix 1).

The PPP guidelines are set out in Ministerial Decree No. 130/2006 and are compulsory for all Category A Projects. Article 15 of the Regulations on the Process of Environmental Impact Assessment defines the PPP as an activity that involves public hearings and consultation. The PPP implies delivery of timely information regarding projects to all directly and indirectly interested and affected parties (I&APs), responding to public requests for explanations on the project and the formulation of suggestions.

[1]Whilst the Mozambican legislation is labelled the "EIA Regulations", this report refers to the mandatory process called for in the regulations as the ESIA process which encompasses socio-economic and bio-physical impact assessments.

Public participation provides an opportunity for stakeholders to learn more about the proposed project and provide their opinions. These need to be incorporated into the ESIA process and should be used to guide further phases of the assessment, and to help mitigate potential conflict situations early in the planning process.

There are six (6) main steps in the ESIA process which are outlined in Figure 1.2 below.

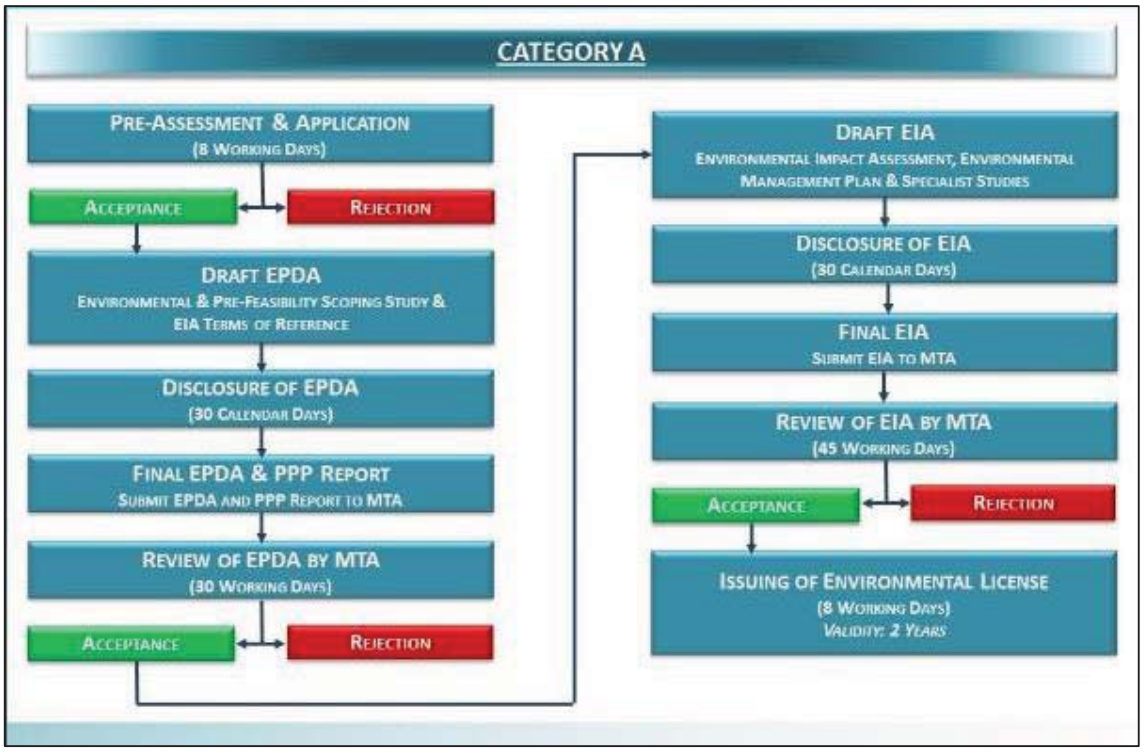


Figure 1.2: Summary of ESIA process to be followed for a Category A project.

Step 1: Pre-Evaluation (Application and Screening)

The first step is environmental screening and is required to define the extent and type of environmental assessment required for a given project. All activities must be screened against Annexure I, II, III and IV as defined in Article 4 of the Environmental Assessment Regulation in order to determine under which project Category (A^{+}, A, B or C) the proposed activity is to be assessed. Factors that are considered during the screening include:

- Scale and type of project;
- Location and sensitivity of the site; and
- Nature and magnitude of potential impacts.

The ESIA Regulations require the completion of a Preliminary Environmental Information form (titled "Environmental Information for the Pre-Assessment of Development Projects" and available as Annex VI of the ESIA Regulations) before the ESIA process may commence. This form, commonly referred to as the AIA form, requires the following information:

- Name of activity.
- Identity of applicant.
- Address and contact details of applicant.
- Location of proposed activity – Street; Town; Locality; District; Province.
- Type of area.
- Zoning information.
- Description of activity – Infrastructure; Associated Activities; Brief description of technology required for construction and operation; Type origin and quantity of labour; Type, origin and quantity of raw materials; Chemical Products to be used; Type, quantity and origin of water and electricity to be used; Other resources required; Land holding (legal status of physical area required); Alternative locations (reason for choosing the proposed location and identification of at least two alternative locations); Brief environmental description of the area and region; and Supplementary information in the form of maps and diagrams.

The Preliminary Environmental Information (AIA) form was submitted to MTA on the 22nd of February 2022 and a categorisation letter was issued by the authorities on the 6th of June 2022 (N/Ref. No 612/SPA/RLA/220). A copy of the categorisation letter is provided in Appendix 1.

Step 2: Environmental Pre-feasibility Scoping Study and Terms of Reference

An Environmental Pre-feasibility Scoping Study (EPDA) (this report) is obligatory for all Annexure I and II activities as defined by Article 10 of the Environmental Assessment Regulations. The key objectives are to:

- Identify any fatal flaws and environmental risks associated with the implementation of the activity.
- Define the scope of the ESIA process and develop a Terms of Reference (ToR) for this phase should no fatal flaws be identified.

An EPDA report should be produced and should, at the minimum, include the following:

- A non-technical summary highlighting the key issues and conclusions (refer to page ii of this document).
- Details of the proponent and ESIA study team (refer to Section 1.3 of this document).
- Spatial extent of the proposed activity in terms of both direct and indirect influences as well as the pre-development land use in this study area (refer to Figure 1.1, Chapter 2 & Section 3.5 of this document).
- A description of the activity and the different actions to be undertaken, with respect to possible alternatives at the planning, exploration, construction and decommissioning stages (refer to Section 2.9 of this document).
- Identification of important biophysical and socio-economic characteristics of the affected environment (refer to Chapters 3 & 4 of this document).
- Identification of any potential fatal flaw and analysis of the project's environmental and social risks (refer to Chapter 6 of this document).
- Identification of all aspects that need to be addressed in the ESIA study phase, and presentation of the terms of reference for specialist studies. These must describe, in detail, the issues to be investigated by each specialist study during the next phase of the ESIA process (refer to Chapter 7 of this document).

Step 3: Authority Review of the Environmental Pre-feasibility Scoping Study and Terms of Reference

The EPDA and ToR report will be presented in Portuguese to MTA for review. The authority may request additional information and should provide comment and recommendations within 30 days of receiving the final report.

Step 4: The Public Participation Process (EPDA and ESIA Phase)

The PPP involves consultation with the wider public. The process facilitates the dissemination of information about the project and identification of indirectly and directly affected I&APs. The proponent is required to undertake the PPP throughout the ESIA process. This includes providing sufficient advertising and affording I&APs an opportunity to participate in public meetings during both the EPDA and ESIA phases of the project. The PPP will be undertaken based on any directives given by the relevant authority, and the results of the process will be summarised in a final Public Participation Report. A public meeting must be advertised at least 15 days in advance, to which all I&APs must be invited and the technical reports of the EPDA and ESIA must be made available for public comment.

Public meetings will be held for the disclosure of the draft EPDA and ESIA at the villages that will be directly affected by the project activities as well as at the District Administrator offices. Two mandatory disclosure session will be undertaken for the proposed project, one during the EPDA Phase of the proposed project and one during the ESIA Phase of the proposed project.

Step 5: Environmental Impact Study and Environmental Management Programme (EMPr)

Undertaking the ESIA process is the responsibility of the proponent and the ESIA team and will be undertaken in line with the ToR set out in this EPDA. The study will be summarised in

an Environmental and Social Impact Assessment Report (ESIA). To address the issues raised during the EPDA process, the ESIA study will include specialist studies to provide a detailed and thorough examination of key environmental impacts. Once completed, these findings will be synthesized into the ESIA.

All specialist studies will include specific recommendations aimed at avoiding, or where this is not possible, reducing negative impacts and maximizing positive impacts during the construction, operation and decommissioning phases of the proposed development. These recommendations will be synthesized into an Environmental Management Programme (EMPr).

Step 6: Authority Review of the Environmental Impact Report and Environmental Management Programme

The Environmental Impact Report, Specialist Studies Volume and Environmental Management Programme will be presented to MTA for review. The review should be undertaken within 45 days of receiving the final reports. Upon completion of the review, MTA will provide a final Record of Decision. Based on Article 19 of the Environmental Assessment Regulations this may be one of the following:

- Positive record of decision;
- Total rejection of the activity based on the outcomes of the reports and the final environmental impact statement; or
- Partial rejection of the activity based on the outcomes of the reports and the final environmental impact statement.

In providing an environmental license, the relevant authority may seek to place conditions of approval that are legally binding on the proponent. Furthermore, the authority may request changes to the project scope or additional ESIA studies.

According to Article 20 of the Mozambique ESIA Regulations (Decree No. 54/2015) the licensing steps are as follows:

- Issuance of provisional environmental license - environmental license issued after the approval of the EPDA and the AIA;
- Issuance of the installation environmental license - License issued after the approval of the ESIA and the presentation of the resettlement plan (if applicable); and
- Issuance of the environmental operating license - license issued after verification/inspection of full compliance with the ESIA after construction and full implementation of the Resettlement Plan (if required).

1.6 Applicable Mozambican Legislation

A summary of the ESIA process for a Category A project is presented in Figure 1.2Figure 1.2 above and a summary of the national legislation applicable to the proposed development is provided below in Table 1.1. It should be noted that the list provided below is not exhaustive, is not a legal register, and has been restricted to documents that have direct relevance to either the environment and/or communities.

Table 1.1: List of applicable national legislation.

LEGISLATION	DATE OF ENACTMENT	APPLICABILITY TO THE PROJECT
NATIONAL LEGISLATION		
Constitution of the Republic of Mozambique	2004	Dictates the right to environment for each citizen in section 7.1: "*All citizens shall have the right live in a balanced environment and shall have the duty to defend it*".
INDUSTRIAL LICENSING AND LABOUR LAW		
General Investment Act	Law 3/1993 of June 24th	International businesses are required to abide by commercial laws of the operating country.
Investment Law Regulation	Decree 43/2009 of 21st August	The Investment Law promotes improvement in the implementation of investment projects in order to make them more attractive to investors by simplifying the process for approval of investments and reducing existing bureaucracies in this area.
Labour Act	Law no. 23/2007 of August 1st	International businesses are required to abide by labour regulation of the operating country.
ENVIRONMENTAL FRAMEWORK LAW, ESIA, INSPECTIONS AND AUDITS		
Environment Act	Law 20/1997 of October 1st (As amended by the Decree 42/2008)	The project will have an environmental impact, and as such will fall under the ambit of the Environmental Act. The Act is the foundation for legal requirements pertaining to the protection of the country's environment. Article 2 defines the legal basis for use and management of the environment and its objectives to achieve sustainable development in the country.
Environmental Impact Assessment (EIA) Regulations	Decree 54/2015 of December 31st	This outlines the process and rules to be followed when conducting an EIA (referred to as an ESHIA process in this report). It describes the type of project categories based on the size and impacts of the project, the responsibility of the applicant, authorities and Environmental Consultant, the Public Participation Process (PPP) and the Environmental Licensing Process.
Addendum to the EIA Regulations no. 45/2004	Ministerial Diploma 198/2005 of September 28th	The environmental authorization required prior to commencements of this project will be regulated by these EIA regulations and the General Directive.
General Directive for EIA	Ministerial Diploma 129/2006 of July 19th	
General Directive for the Public Participation Process in the ESIA process	Ministerial Diploma 130/2006 of July 19th	Public participation forms a crucial part of the ESIA process and is mandatory for category A+, A and B projects. At least two public consultation rounds must take place and a final PPP report that addresses all questions, concerns and comments raised by I&APs must be submitted with the ESIA report to the authorities.

LEGISLATION	DATE OF ENACTMENT	APPLICABILITY TO THE PROJECT
Regulations for Environmental Inspections	Ministerial Decree 11/2006 of June 15th	The Regulation apply to both public and private activities influencing, directly or indirectly, environmental components. In particular, the regulation defines the types and contents of environmental audits, the related necessary competences and auditors' profiles. Moreover, it regulates environmental audit reports and defines sanctions and penalties for non-compliance. Auditing and monitoring form crucial parts of the ESIA process, and as such this act directly impacts on the regulatory requirements to which the proponent must adhere
Environmental Audit Process	Ministerial Decree 32/2003 of August 12th	
Extracts from the Penal Code	16 September 1886	These regulations define the consequences of environmental non-compliance and infringements.
Norms of application of fines and other sanctions prescribed in the Environmental legislation	Ministerial Diploma 1/2006 of January 4th	
Law on Crimes against the Environment	Ministerial Diploma of 2006/7	
SOCIAL		
Protection of the Mozambican Cultural Heritage	Law No. 10/1988 of December 22nd	The purpose of this law is to protect the tangible and intangible assets of the Mozambican cultural heritage – e.g. monuments, buildings of historical, artistic and scientific value and natural elements of scientific interest and of particular aesthetic value. This law extends to any cultural assets that may be discovered on Mozambican territory, in particular, in the soil, subsoil, inland bodies of water or the continental shelf. These can include monuments, groups of buildings with historic, artistic, or scientific importance, places or locations (with sacred, archaeological, historic, aesthetic, ethnologic, or anthropologic interest), and natural elements (physical and biological formations of particular interest from an aesthetic or scientific point of view).
Archaeological Heritage	Decree 27/1994 of July 20th	Heritage Resources may be disturbed and impacted by the mining activities and, as such, fall under the ambit of these regulations.
Regulation on the Protection of the Archaeological Heritage	Decree 27/97 of July 20th.	
Regulation of Resettlement Process Resulting from Economic Activities	Decree 31/2012 of August 8th	These regulations were passed in 2012. The regulations consist of 28 articles which formulate the procedures for any resettlement in Mozambique, and especially articulate the assistance required from government during a resettlement process.

LEGISLATION	DATE OF ENACTMENT	APPLICABILITY TO THE PROJECT
Land Act	Law19/97 of October 1st	The Land Act provides the legal framework for land ownership, as well as the control of land and natural resources in Mozambique. The process of determining land rights is also explained by this law. As Kenmare Resources will require land use rights (DUAT) in order to establish the proposed mining operation, this law is relevant.
Land Act Regulations	Decree 1/2003 of February 18th	Land appropriation and ownership rights are pivotal to the project's implementation. Consultations between the applicants for land and the local community are mandatory before a decision to grant title use is made by the provincial governor or higher authority.
Land Planning Act	Law 19/2007 of July 18th	The Land Planning Act (Law 19/2007 of July 18) creates a legal framework for land planning. The Act defines the mechanisms for preparation, approval, implementation, monitoring and supervision of land-use plans, as well as the responsibilities associated therewith.
Regulation of the Land Planning Act	Decree no. 23/2008	This Act sets out measures and regulatory procedures to ensure the provisions of the Land Planning Act are complied with.
WATER RESOURCES		
Water Act	Law 16/1991 of August 3rd	The statutory legal framework regulating water use.
Water License and Concessions Regulations	Decree 43/2007 of October 30th	A water use license or concession will be required for the construction and operation of this project.
Water Policy	Decree 46/2007 of August 21th	
WASTE, EFFLUENT AND EMISSION		
Regulation on Environmental Quality and Effluents Emissions	Decree 18/2004 of June 2nd and respective amendments approved by Decree 67/2010 of 31 December)	This decree defines air quality and emission standards, classifies water according to its uses and defines quality control standards and emission requirements with special regard to potable water. It also provides standards for soil quality and noise emissions.
Waste Management Regulations	Ministerial Decree 13/2006 of June 15th	Labour and construction camps, as well as permanent accommodation and lodgings will be subject to these waste regulations.
Regulations for the management of solid municipal waste	Decree 94/2014 of December 31st	This decree establishes the rules for the management of solid municpal waste and is applicable to every individual as well as all private and public companies within the country that produce solid municipal waste. Article 10 (Duty of Information) specifies that in the event of any solid waste spills, the Municipal Council must be informed within 24 hours of the incident occurring. Article 11 and 12

LEGISLATION	DATE OF ENACTMENT	APPLICABILITY TO THE PROJECT
		deals with the obligations of producers and operators of solid waste as well as the transportation of this waste.
Regulation on management of hazardous waste	Decree N.83/2014 of December 31	This decree establishes the general rules for the production, management and disposal of hazardous waste in Mozambique. It applies to all entities involved in the disposal, management, import or distribution of hazardous waste and establishes fees and penalties for non-compliance.
Regulations on the management and control of plastic bags	Decree 16/2015 of August 5th	Management Regulations and Plastic Bag Control applies to all public and private entities, natural and legal persons involved in the production, import, sale and use of plastic bags in the country.
BIODIVERSITY AND WILDLIFE		
Wildlife and Forestry Act	Law 10/1999 of July 7th	This Regulation applies to protection activities, storage, use, exploitation and production of forest and wildlife resources, and covers the marketing, transportation, storage and primary processing, trade or industrial applications of these resources.
Wildlife and Forestry Regulations	Decree 10/1999 of July 6th	The law is divided into nine chapters. Of relevance to this ESIA are the following chapters: 1. Chapter 2 on the Protection of Forest and Wildlife Resources; and 2. Chapter 3 on Sustainable Forest Resources, Exploitation Regimes and Sustainable Wildlife Conservation Regimes.
The Regulations on the Law of Wildlife and Forestry	Decree 12/2002	These regulations provide further guidance to The Wildlife and Forestry Act (1999).
National Strategy and Action Plan for the Conservation of Biological Diversity for Mozambique	Formulated by MICOA (now MTA) and passed by the Council of Ministers in August 2003	Biodiversity and wildlife management will form part of the mitigation measures for the project
Regulations on Pesticide Management	Decree No. 6 of 2009	The Regulation aims at guaranteeing that human health and the environmental quality standards are upheld, according to environmental legal proceedings approved by Law No. 20/97. It includes the management, composition, classification and inspections to be carried out on pesticides. The annexes specify offences and penalties to be paid for illegal activities.
Control of Exotic Invasive Species Act	Law 25/2008 of 01 July	Weed control required throughout the construction and operation phases will be directly regulated by this act.
Biodiversity Counterbalances	Decree 55/2022 of 19 May	This legal instrument arises as a requirement of the Environmental Impact Regulations (Decree 54/2015 of 31 December) and enable the Government of Mozambique to ensure that Category A+ or A projects that will result in residual negative impacts on important biodiversity (e.g. threatened species or ecosystems) implement biodiversity offset

LEGISLATION	DATE OF ENACTMENT	APPLICABILITY TO THE PROJECT
		management plans (conservation projects) to ensure no net loss / a net gain in biodiversity. This Directive establishes the principles, methodologies, requirements and procedures for the correct implementation of of Biodiversity Offsets, integrated in the environmental impact assessment process.
Creating the environmental protected areas of Primeiras islands in the District of Pebane and Segundas islands in the Districts of Angoche and Moma	Decree No. 42/2012 of 12 December 2012.	The Primeiras and Segundas Environmental Protection Area/ Área de Protecção Ambiental das Ilhas Primeiras e Segundas (APAIPS) was promulgated by Decree No. 42/2012 issued on 12 December 2012. The area is rich in biodiversity and is an integral part of the East African Marine Eco-Region which stretches from southern Somalia to the Kwazulu-Natal coast in the Republic of South Africa. This area ensures connectivity between coastal and marine habitats, both physically and ecologically, with emphasis on: • Mangrove forests along the various estuaries; • Seagrass beds; • Coral reefs; • Large sand banks forming part of Sofala Bank; • Water gradients from the coast to depths of over 1000 meters in less than 25 to 35 km from the coast harboring various plant and wildlife species
Conservation Law	Law No. 16/2014 of 20 June 2014	This law establishes the basic principles and rules for the protection, conservation and sustainable use of biological diversity within conservation areas, as well as the integrated administration of these conservation areas to promote the sustainable development of the country. It applies to all values and natural resources existing in the national territory and in waters under national jurisdiction, including all public or private entities that directly or indirectly may influence the national system of conservation areas in the country. In addition, it regulates the management of conservation areas, protection zones, recovery and restoration of biological diversity, management of endangered species, resettlement and rates, and setting respective inspection and sanction regimes. The Law is divided as follows: General principles (Chap. I); Management of Conservation Areas (Chap. II); Protection Areas (Chap. III); Recuperation and restoration of biological diversity (Chap. IV); Endangered Flora and Fauna species (Chap. V); Resettlement (Chap. VI); Taxes (Chap. VII); Inspection (Chap. VIII); Offence and penalties (Chap. IX); Final provisions (Chap. X).
MINING ACTIVITIES		
Technical Health and Safety Regulations of Geological and Mining Activities	Decree No. 61/2006 of 26 December	The Regulations on Health and Safety on Mining Activities (Decree 61/2006, of 26 December 2006) set out the rules and procedures for the safety of employees during mining operations, amended by Decree 34/2019, of 2 May 2019.

LEGISLATION	DATE OF ENACTMENT	APPLICABILITY TO THE PROJECT
		Article 259 (Tailings Storage Facility) states that construction, operation and closing of tailings storage in the area of mineral resources shall follow a project approved by the relevant authorities. Points 1 to 9 describes a risk-based approach to the management of TSFs including tailings management standards and procedures to adhere to the Mozambican National Regulation for Tailings Dams. It also mentions to comply with safety requirements the identification of geotechnical risk are recommended.
Hiring regulations of Foreign Nationals in the Oil Sector and Mining	Decree n.º63 / 2011 of 7 December	Establishes the legal framework including the mechanisms and procedures for employing foreign nationals under the Petroleum and Mining Law, as long as those activities have been approved by the competent authority. This decree dictates that for short-term activities not exceeding 180 days, hiring of skilled foreign workers can be carried out without a permit from the Minister of Labour, provided the Ministry of Labour is notified within 15 days of the employee entering in the country.
The Mining Law	20/2014 of 18 August	Law No. 20/2014, of 18 August entered into force on the same date the Mining Act (Law No. 14/2002 of 26 June) was repealed, sets out the legal framework for the mining sector. It aims to ensure greater competitiveness and transparency, preserve the environment, ensure the protection of the rights and obligations of the holders of mining rights, safeguard national interests and benefit affected communities.
Mining Law Regulations	Ministerial Decree 31/2015 of 31 December	The purpose of these regulations is to regulate the use and re-use of mineral resources to ensure that the best and safest mining and socio-environmental practices are adhered to, to allow for transparency and to ensure the sustainable long term development of mineral resources and subsequent raising of revenues in favour of Mozambique.
Environmental Regulations for Mining Activities	Ministerial Decree 26/2004 of August 20th	This law defines the norms for the prevention, control, mitigation and compensation of adverse effects that mining activities might cause to the environment. It also provides specific environmental protection measures, defines the required environmental management instruments (e.g. the EIA process) and the use of licenses.
Mining Working Regulations	Decree 13/2015 of 03 July	The new regulation of mining work addresses a major gap in the legislation on professional work in this area that has generated employment for Mozambican citizens, although there are also a significant number of foreign workers in the sector. To fill the gap in the legislation, the Mining Work Regulation were promulgated to govern labour relations between mining and oil sector employers, including subcontractor companies, and their employees, whether Mozambican or foreign. It also provides for supervision of employment conditions.

1.7 APPLICABLE INTERNATIONAL LEGISLATION

1.7.1 The Equator Principals

The Equator Principles (Table 1.2 below) are a financial industry benchmark for determining, assessing and managing social and environmental risks to projects. They are intended to ensure that projects financed by the Equator Principles Financial Institutions (EPFI) are developed in a manner that is socially responsible and reflects sound environmental management practices. Currently there are 132 financial institutions in 38 countries across the globe had adopted the Equator Principles (https://equator-principles.com/members-reporting).

Table 1.2: The Equator Principles (EP III - June 2013).

EQUATOR PRINCIPLE	SUMMARY
Principle 1: Review and Categorisation	When a Project is proposed for financing, the EPFI will as part of its internal environmental and social review and due diligence categorise it based on the magnitude of its potential environmental and social risks and impacts. Such screening is based on the environmental and social categorisation process of the International Finance Corporation (IFC). Using categorisation, the EPFI's environmental and social due diligence is commensurate with the nature, scale and stage of the Project, and with the level of environmental and social risks and impacts. The categories are: • **Category A** – Projects with potential significant adverse environmental and social risks and/or impacts that are diverse, irreversible or unprecedented. • **Category B** – Projects with potential limited adverse environmental and social risks and/or impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures. • **Category C** – Projects with minimal or no adverse environmental and social risks and/or impacts.
Principle 2: Environmental and Social Assessment	For all Category A and Category B Projects the EPFI will require the client to conduct an Assessment process to address, to the EPFI's satisfaction, the relevant environmental and social risks and impacts of the proposed Project (which may include the illustrative list of issues found in Exhibit II [1]). The Assessment Documentation should propose measures to minimise, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of the proposed Project. The Assessment Documentation will be an adequate, accurate and objective evaluation and presentation of the environmental and social risks and impacts, whether prepared by the client, consultants or external experts. For Category A, and as appropriate, Category B Projects, the Assessment Documentation includes an Environmental and Social Impact Assessment (ESIA). One or more specialised studies may also need to be undertaken. Furthermore, in limited high risk circumstances it may be appropriate for the client to complement its Assessment Documentation with specific human rights due diligence. For other projects, a limited or focused environmental or social assessment (e.g. audit), or straightforward application of environmental siting, pollution standards, design criteria, or construction standards may be carried out.

EQUATOR PRINCIPLE	SUMMARY
	For all projects, in all locations, when combined Scope 1 and Scope 2 Emissions are expected to be more than 100 000 tonnes of CO_2 equivalent annually, an Alternatives Analysis must be conducted to evaluate less Greenhouse Gas (GHG) intensive alternatives.
Principle 3: Applicable Environmental and Social Standards	The Assessment process should, in the first instance, address compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues. EPFIs operate in diverse markets: some with robust environmental and social governance, legislation systems and institutional capacity designed to protect the people and the natural environment; and some with evolving technical and institutional capacity to manage environmental and social issues. The EPFI will require that the Assessment process evaluates compliance with the applicable standards as follows: • For projects located in Non-Designated Countries, the Assessment process evaluates compliance with the then applicable IFC Performance Standards on Environmental and Social Sustainability (Performance Standards) and the IFC / World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) (Exhibit III [2]). • For projects located in Designated Countries, the Assessment process evaluates compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues. Host country laws meet the requirements of environmental and/or social assessments (Principle 2), management systems and plans (Principle 4), Stakeholder Engagement (Principle 5) and, grievance mechanisms (Principle 6). The Assessment process will be established to the EPFI's satisfaction the Project's overall compliance with, or justified deviation from, the applicable standards. The applicable standards (as described above) represent the minimum standards adopted by the EPFI. The EPFI may, at their sole discretion, apply additional requirements.
Principle 4: Environmental and Social Management System and Equater Principles Action Plan	For all Category A and Category B Projects the EPFI will require the client to develop or maintain an Environmental and Social Management System (ESMS). Further, an Environmental and Social Management Plan (ESMP) will be prepared by the client to address issues raised in the Assessment process and incorporate actions required to comply with the applicable standards. Where the applicable standards are not met to the EPFI's satisfaction, the client and the EPFI will agree an Equator Principles Action Plan (AP). The Equator Principles AP is intended to outline gaps and commitments to meet EPFI requirements in line with the applicable standards.
Principle 5: Stakeholder Engagement	For all Category A and Category B Projects the EPFI will require the client to demonstrate effective Stakeholder Engagement as an ongoing process in a structured and culturally appropriate manner with Affected Communities and, where relevant, other stakeholders. For Projects with potentially significant adverse impacts on Affected Communities, the client will conduct an Informed Consultation and Participation process. The client will tailor its consultation process to: the risks and impacts of the Project; the Project's phase of development; the language

EQUATOR PRINCIPLE	SUMMARY
	preferences of the Affected Communities; the decision-making processes; and the needs of disadvantaged and vulnerable groups. This process should be free from external manipulation, interference, coercion and intimidation. To facilitate Stakeholder Engagement the client will, commensurate to the Project's risks and impacts, make the appropriate Assessment Documentation readily available to the Affected Communities, and where relevant other stakeholders, in the local language and in a culturally appropriate manner. The client will take account of and document the results of the Stakeholder Engagement process, including any actions agreed resulting from such process. For Projects with environmental or social risks and adverse impacts disclosure should occur early in the Assessment process, in any event before the Project construction commences, and on an ongoing basis. EPFIs recognise that indigenous peoples may represent vulnerable segments of project-affected communities. Projects affecting indigenous peoples will be subject to a process of Informed Consultation and Participation, and will need to comply with the rights and protections for indigenous peoples contained in relevant national law, including those laws implementing host country obligations under international law. Consistent with the special circumstances described in with adverse impacts on indigenous people will require their Free, Prior and Informed Consent (FPIC).
Principle 6: Grievance Mechanism	For all Category A and, as appropriate, Category B Projects, the EPFI will require the client, as part of the ESMS, to establish a grievance mechanism designed to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance. The grievance mechanism is required to be scaled to the risks and impacts of the Project and have Affected Communities as its primary user. It will seek to resolve concerns promptly, using an understandable and transparent consultative process that is culturally appropriate, readily accessible, at no cost, and without retribution to the party that originated the issue or concern. The mechanism should not impede access to judicial or administrative remedies. The client will inform the Affected Communities about the mechanism in the course of the Stakeholder Engagement process.
Principal 7: Independent Review	*Project Finance*: For all Category A and, as appropriate, Category B Projects, an Independent Environmental and Social Consultant, not directly associated with the client, will carry out an Independent Review of the Assessment Documentation including the ESMPs, the ESMS, and the Stakeholder Engagement process documentation in order to assist the EPFI's due diligence and assess Equator Principles compliance. The Independent Environmental and Social Consultant will also propose or opine on a suitable Equator Principles AP capable of bringing the Project into compliance with the Equator Principles, or indicate when compliance is not possible. *Project-Related Corporate Loans*:

EQUATOR PRINCIPLE	SUMMARY
	An Independent Review by an Independent Environmental and Social Consultant is required for Projects with potential high risk impacts including, but not limited to, any of the following: • Adverse impacts on indigenous peoples • Critical habitat impacts • Significant cultural heritage impacts • Large-scale resettlement In other Category A, and as appropriate Category B, Project-Related Corporate Loans, the EPFI may determine whether an Independent Review is appropriate or if internal review by the EPFI is sufficient. This may take into account the due diligence performed by a multilateral or bilateral financial institution or an OECD Export Credit Agency, if relevant.
Principle 8: Covenants	An important strength of the Equator Principles is the incorporation of covenants linked to compliance. For all Projects, the client will covenant in the financing documentation to comply with all relevant host country environmental and social laws, regulations and permits in all material respects. Furthermore for all Category A and Category B Projects the client will covenant the financial documentation: • To comply with the ESMPs and Equator Principles AP (where applicable) during the construction and operation of the Project in all material respects; and • To provide periodic reports in a format agreed with the EPFI (with the frequency of these reports proportionate to the severity of impacts, or as required by law, but not less than annually), prepared by in-house staff or third party experts that (i) document compliance with the ESMPs and Equator Principles AP (where applicable), and (ii) provide representation of compliance with relevant local, state and host country environmental and social laws, regulations and permits; and • To decommission the facilities, where applicable and appropriate, in accordance with an agreed decommissioning plan. Where a client is not in compliance with its environmental and social covenants, the EPFI will work with the client on remedial actions to bring the Project back into compliance to the extent feasible. If the client fails to re-establish compliance within an agreed grace period, the EPFI reserves the right to exercise remedies, as considered appropriate.
Principle 9: Independent Monitoring	*Project Finance*: To assess Project compliance with the Equator Principles and ensure ongoing monitoring and reporting after Financial Close and over the life of the loan the EPFI will, for all Category A and, as appropriate, Category B Projects, require the appointment of an Independent Environmental and Social Consultant, or require that the client retain qualified and experienced external experts to verify its monitoring information, which would be shared with the EPFI. *Project-Related Corporate Loans*: For Projects where an Independent Review is required under Principle 7 the EPFI will require the appointment of an Independent Environmental and Social Consultant after Financial Close, or require that the client retain qualified and experienced external experts to verify its monitoring information which would be shared with the EPFI.

EQUATOR PRINCIPLE	SUMMARY
Principle 10: Reporting and Transparency	*Client Reporting Requirements*: The following client reporting requirements are in addition to the disclosure requirements in Principle 5. For all Category A and, as appropriate, Category B Projects: • The client will ensure that, at a minimum, a summary of the ESIA is accessible and available online. • The client will publicly report GHG emission levels (combined Scope 1 and Scope 2 Emissions) during the operational phase for Projects emitting over 100,000 tonnes of CO_2 equivalent annually. Refer to Annex A for detailed requirements on GHG emissions reporting. *EPFI Reporting Requirements:* The EPFI will report publicly, at least annually, on transactions that have reached Financial Close and on its Equator Principles implementation processes and experience, taking into account appropriate confidentiality considerations. The EPFI will report according to the minimum reporting requirements detailed in Annex B.

Notes:

[1] **Exhibit II:** Illustrative List of Potential Environmental and Social Issues to be addressed in the Environmental and Social Assessment Documentation.

[2] **Exhibit III:** IFC Performance Standards on Environmental and Social Sustainability and the IFC / World Bank Group Environmental, Health and Safety Guidelines

The IFC Performance Standards to which the Equator Principles refer, specifically in Exhibit III, are those that were published and took effect on the 1st of January 2012.

1.7.2 International Finance Corporation Performance Standards

The IFC is a member of the World Bank Group and is the largest global development institution focused exclusively on the private sector in developing countries. Established in 1956, the IFC is owned by 184 member countries and provides funding for emerging markets to create jobs, generate tax revenues, improve corporate governance and environmental performance, and contribute to the local communities.

The IFC published its Performance Standards (PS) on Environmental and Social Sustainability in April 2006 and published comprehensive Guidance Notes in July 2007. Since then, the Performance Standards and Guidance Notes have been revised, and the updated versions were published and took effect from January 2012. The updated Performance Standards are listed and described in Table 1.3.

Table 1.3: The IFC Performance Standards.

PERFORMANCE STANDARD	KEY OBJECTIVES
PS 1: Assessment and management of environmental and social risks and impacts *(updated 14 June 2021)*	• To identify and evaluate environmental and social risks and impacts of the project. • To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment. • To promote improved environmental and social performance of clients through the effective use of management systems. • To ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately. • To promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated.
PS 2: Labour and Working Conditions	• To promote the fair treatment, non-discrimination, and equal opportunity of workers. • To establish, maintain, and improve the worker-management relationship. • To promote compliance with national employment and labour laws. • To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain. • To promote safe and healthy working conditions, and the health of workers. • To avoid the use of forced labour.
PS 3: Resource efficiency and pollution prevention	• To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities. • To promote more sustainable use of resources, including energy and water. • To reduce project related GHG emissions.
PS 4: Community Health, Safety and Security	• To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances. • To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.

PS 5: Land Acquisition and Involuntary Resettlement	• To avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs.
	• To avoid forced eviction.
	• To anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by:
	  ○ Providing compensation for loss of assets at replacement cost and
	  ○ Ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected.
	• To improve, or restore, the livelihoods and standards of living of displaced persons.
	• To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.

PERFORMANCE STANDARD	KEY OBJECTIVES
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources *(updated 27 June 2019)*	• To protect and conserve biodiversity. • To maintain the benefits from ecosystem services. • To promote the sustainable management of living natural resources through the adoption of practices that integrates conservation needs and development priorities.
PS 7: Indigenous Peoples	• To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples. • To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts. • To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner. • To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life-cycle. • To ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present. • To respect and preserve the culture, knowledge, and practices of Indigenous Peoples.
PS 8: Cultural Heritage	• To protect cultural heritage from the adverse impacts of project activities and support its preservation. • To promote the equitable sharing of benefits from the use of cultural heritage.

1.7.3 IFC Environmental, Health and Safety General Guidelines

The Environmental, Health and Safety (EHS) General Guidelines provide an organized, hierarchical, best-practice approach to managing environmental, health and safety issues at facility or project level, which in broad terms comprises the following steps:

- Identifying EHS project hazards and associated risks as early as possible in the facility development or project cycle.
- Understanding the likelihood and magnitude of EHS risks, based on the nature of the project activities and the potential consequences to workers, communities, or the environment if hazards are not adequately managed.
- Prioritising risk management strategies with the objective of achieving an overall reduction of risk to human health and the environment, focusing on the prevention of irreversible and / or significant impacts.
- Favouring strategies that eliminate the cause of the hazard at its source to avoid the need for EHS controls.
- When impact avoidance is not feasible, incorporating engineering and management controls to reduce or minimize the possibility and magnitude of undesired consequences.

- Preparing workers and nearby communities to respond to accidents, including providing technical and financial resources to control such events effectively and safely, and subsequently restoring workplace and community environments to a safe and healthy condition.
- Improving EHS performance through a combination of ongoing monitoring of facility performance and effective accountability.

The Guidelines are organised in four main sections:

1. Environmental
2. Occupational Health and Safety
3. Community Health and Safety
4. Construction and Decommissioning.

1.7.4 IFC EHS Guidelines for Mining

The IFC EHS Guidelines for Mining (10 December 2007) are applicable to this project. The guidelines detail industry-specific impacts and ways to manage them. They cover environmental, occupational health and safety, community health and safety, performance indicators, and monitoring.

1.7.5 The African Development Bank Environmental Guidelines for Mining Projects (June 1995)

The Common Terms Agreement signed between Kenmare and the African Development Bank (AfDB) stipulates that all Kenmare activities must adhere to the June 1995 AfDB Environmental Guidelines for Mining Projects. The guidelines stipulate the requirements for environmental impact assessments in order to identify all issues likely to result from mining projects. The guidelines list several issues to be considered during the pre-implementation, operation and post mining phases for medium and large-scale mining projects. These requirements are largely covered in the IFC Performance Standards discussed above. In addition, the guidelines stipulate guidelines for air and water pollutants as well as noise and vibrations recommended limit. In cases where different standards are required by different lending agencies (e.g., IFC vs AfDB) the most stringent standard will be applied.

1.7.6 World Bank Environment, Health and Safety Guidelines for Mining and Milling – Open pit

As with the AfDB guidelines, the Common Terms Agreement signed by Kenmare stipulates that Kenmare activities must adhere to the World Bank's Environment, Health and Safety Guidelines for Mining and Milling – Open Pit. These guidelines specifically address various aspects of mining such as tailings disposal, liquid effluent quality guidelines, residual heavy metals, ambient air quality guidelines, erosion and sediment control, mine reclamation, sewage sludge disposal, solid waste disposal, health and safety in the workplace and training amongst others. As stated in the previous section, in cases where several guideline values provide different values for a given parameter, the most stringent will be applied.

1.7.7 World Health Organisation Guidelines for Drinking Water Quality (2011)

The primary purpose of the WHO Guidelines for drinking-water quality is the protection of public health and it provides the recommendations for managing the risk from hazards that may compromise the safety of drinking-water. The Ministerial Diploma of 18/2004 was adapted from the WHO drinking water guidelines and will be adopted for managing the drinking water quality supplied for the construction and operational phases of the project.

1.7.8 International Conventions

Mozambique is a signatory to a number of international conventions. Those applicable to this project are summarised in Table 1.4 below.

Table 1.4: International conventions applicable to the project.

CONVENSIONS	RATIFIED
BIODIVESITY	
Convention on International Trade and Endangered Species of Wild Fauna and Flora (CITES)	1973
Convention on Biological Diversity (CBD)	1992
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention)	2 Proclaimed RAMSAR Sites 1971
African Convention on the Conservation of Nature and Natural Resources	1968
African Convention on the Conservation of Nature and Natural Resources	2003
Convention on the Conservation of Migratory Species of Wild Animals	2009
WASTE	
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	1989
Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa	1991
CLIMATE CHANGE	
Kyoto Protocol to the UN Framework Convention on Climate Change	1998
UN Framework Convention on Climate Change (read with Kyoto Protocol)	1992
Vienna Convention for the Protection of the Ozone Layer	1985
Montreal Protocol on Substances that Deplete the Ozone Layer	1987
International Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa	1994
CULTURAL HERITAGE	
UN Convention Concerning the Protection of World Cultural and Natural Heritage	1972
OTHER	
Constitutive Act of the African Union	2000
Stockholm Convention on Persistent Organic Pollutants	2001
International Convention on Civil Liability for Oil Pollution Damage	1992

CONVENSIONS	RATIFIED
Treaty Establishing the African Economic Community	1991
African Charter on Human and Peoples' Rights	1981
United Nations Convention on the Law of the Sea	1982
SADC Protocol on Mining	1997

1.7.9 International Labour Organization

Core Principles

The International Labour Organisation (ILO) Declaration on Fundamental Principles and Rights at Work, adopted in 1998, commits Member States to respect and promote principles and rights in four categories, often referred to as the Core Principles, which are:

- Freedom of association and the effective recognition of the right to collective bargaining.
- The elimination of forced or compulsory labour.
- The abolition of child labour.
- The elimination of discrimination in respect of employment and occupation.

Basic Terms and Conditions of Employment

Relevant Conventions under this general heading are as follows:

- Convention (C1) Limiting the Hours of Work in Industrial Undertakings to Eight in the Day and Forty-eight in the Week, 1921.
- Convention (C26) concerning the Creation of Minimum Wage-Fixing Machinery, 1930.
- Convention (C155) concerning Occupational Safety and Health and the Working Environment, 1983, together with Protocol (P155) of 2002 to the Occupational Safety and Health Convention, which came into force in 2005, and the Convention (C187) concerning the Promotional Framework for Occupational Safety and Health, which came into force in 2009.

Code of Practice on HIV/AIDS and the World of Work

This Code of Practice was developed by the ILO in order to assist with the prevention of the spread of HIV/AIDS, to mitigate its impact on workers and their families and to provide social protection to help cope with the disease. It covers key principles, such as:

- The recognition of HIV/AIDS as a workplace issue;
- Non-discrimination in employment;
- Gender equality;
- Screening and confidentiality;
- Social dialogue; and
- Prevention, care and support, as the basis for addressing the epidemic in the workplace.

2 PROJECT DESCRIPTION

2.1 INTRODUCTION AND PROJECT BACKGROUND

The proposed development is located approximately 8 km south-west of Kenmare's existing Namalope Mine, within Kenmare's existing concession (refer to Figure 1.1 above). Mining will involve site clearance, dredge, hydraulic and dry mining, separation of the minerals, sand and fine material, management of the tailings and progressive rehabilitation of the mined areas. Further processing, storage and shipping of the products will take place at the current operations. The aspects assessed in this ESHIA include site preparation (construction phase), the mining and separation of the resource at the Nataka site and the transportation of the heavy mineral concentrate (via pipeline) for further processing at the existing operations at Namalope (operational phase).

The following infrastructure will be associated with the proposed development:

- In path TSF and associated berms.
- Roads to enable access to various parts of the development and for transportation of materials, equipment, supplies and employees - Access roads will be constructed of material obtained from approved borrow pits. Existing public roads will be used as far as possible.
- A lay-down area for construction materials and equipment.
- Workshops for repair of equipment and machinery.
- Bunded storage areas for diesel fuel, lubricants, and waste oil.
- Stores and a lay-down area(s) for equipment, spares and consumables.
- Offices for site staff.
- Ablution facilities and associated sewage treatments plant.
- Boreholes for the supply of potable and operational water.
- Pipelines for supplying additional potable and operational makeup water.
- Process water reservoirs.
- Security measures.
- Electrical infrastructure – Overhead Line (OHL), substations.
- Road and/or pipeline for transportation of Heavy Mineral Concentrate (HMC) to the MSP.
- Eastern infrastructure terrace which will include a HMC Positive Displacement (PD) pumping station (3 PD pumps with one pipeline), slimes PD pump to transfer slimes to the Isoa Valley TSF (5 PD pumps with one pipeline, only to be implemented in the end of the relocation channel), raw water dam, fixed thickeners and flocculant plant (3 x 65m diameter thickeners only applicable to the fixed thickener scenario), Heavy Machinery Equipment (HME) Workshop, Stores, Offices and Ablutions, Wash Bay, Sand Trap, Oil Separator and Water Tanks, Process water dam, HMC Stacker, Reclaim Conveyor and bin discard with reclaim ramp and High Voltage (HV) Yard and substation. Depending on detailed planning it is possible that more than one eastern infrastructure terrace will be required. If this is the case, then the original infrastructure terrace will need to be decommissioned and rehabilitated.

- Western infrastructure terrace which will include HMC PD pumping station (3 PD pumps with one pipeline), the eastern terrace PD pumps will remain in operation and will be used as boosters, slimes PD pump to transfer slimes to the in-path Valley TSF (8 PD pumps with two pipelines, to accommodate the higher volume of slimes in the western part of the orebody). It is recommended that the PD pumps are relocated from the eastern to the western terrace. During this relocation period slimes should be pumped directly to the in-path TSF while WCP-A is still close to the in-path TSF. Other infrastructure includes a raw water dam, fixed thickeners and flocculant plant (4 x 65m diameter thickeners only applicable to the fixed thickener scenario), process water dam, HMC Stacker, Reclaim Conveyor and bin discard with reclaim ramp and a substation.
- Several pipeline routes will be required as follows:
  - HMC pumping from the infrastructure terrace to the MSP.
  - Surface water abstraction pipeline.
  - Water pumping from the infrastructure terrace to the WCP-A pond.
  - Slimes from the infrastructure terrace to the TSF.
  - Water return pipeline from the TSF to the infrastructure terrace.
  - For the floating feed-well option:
    - Thickener feed from WCP-A to infrastructure terrace.
    - Process water from infrastructure terrace to WCP-A pond.
  - For the fixed thickener option:
    - Slimes transfer from WCP-A floating feed-wells to the PD pumping station at the infrastructure terrace

The exact position and size of this infrastructure is not currently defined and will depend on the outcome of the environmental assessment and associated technical studies currently being undertaken by Kenmare.

2.2 DREDGE MINING

2.2.1 Site Clearance

Prior to mining vegetation is cleared, and topsoil removed to a depth of 300 mm. This is preferably stored adjacent to the mine path, but also in long-term stockpiles to assist in subsequent rehabilitation. At the start of construction vegetation clearing will take place at the construction pond and laydown area. Bush will be mechanically cleared, and the topsoil stripped to a depth of 300 mm and stockpiled for later use during operational phase rehabilitation. Once mining starts (i.e. during the operational phase) bush clearing takes place ahead of the mining operations to make way for the advancing dredge pond. Generally, 150 m is cleared ahead of the pond, and a 300 m wide face (ore body) is prepared. After two to three years, once mining has advanced enough the stripped topsoil is loaded and hauled back to a mined area where backfilling with sand tailings has been completed. It is then spread directly over this previously mined area which would have been recontoured. This has the advantage of avoiding large topsoil stockpiles, and the fresh topsoil significantly improves rehabilitation success, since the viability of the seed bank is not reduced, as happens in stockpiles. However, initially topsoil has to be stockpiled until a large enough area has been mined and backfilled so that the rehabilitation process can be safely initiated. Topsoil from the

first year of mining will be stockpiled until mining operations cease and used during the closure phase for final rehabilitation activities.

The low-lying areas and the portions of the river course that fall within the mine path will have to be cleared and prepared differently from the dry land areas. Provision will be made to schedule all clearing of the low-lying areas and river course during the dry season. It is envisaged that bulldozers and long reach excavators equipped with swamp tracks will be used to remove the swampy vegetated materials. This material will be loaded and hauled back to the tailings areas and used as a medium for vegetating the tailings along the diversion river course.

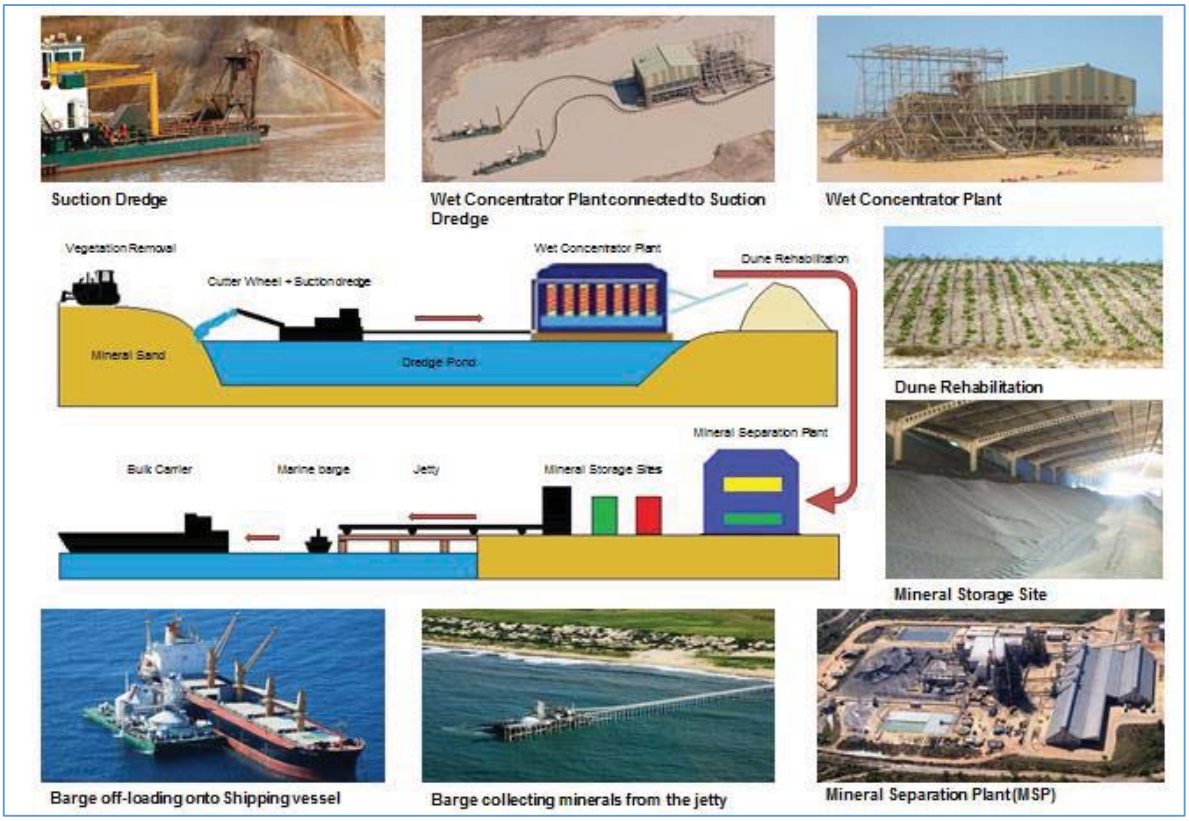


Figure 2.1: Flow diagram illustrating the dredge mining process.

2.2.2 Mining and Processing

Wet mining will be carried out using a cutter-suction dredger operating in a man-made mining pond (300 m wide by 600 m long). The pond will have a minimum mining depth of 5.5 m and a maximum of 15 m below pond water level. The existing Wet Concentrator Plant (WCP-A) and associated dredger, currently being utilised at the Namalope West site, will be transported to the Nataka site via a narrow relocation channel. This relocation channel will be approximately 6.5 km in length and on average 220 m in width. It will allow the dredger to mine through the lower grade areas to reach the high-grade target area at Nataka as fast as possible. Mining in this channel will be minimised, and the route will be designed to minimize any impacts on existing infrastructure and services.

The dredgers operate by cutting sand on one side of the pond (called the working face) and transferring this sand to a WCP which floats behind the dredgers (Plate 2.1). The sand is transported via pipeline to the WCP as a slurry. The slurry is then separated into oversize particles, which are rejected to the back of the pond, and undersized material. The slimes-sized (<45 microns) undersized material is first separated from this material and pumped as a slurry to a tailing's storage facility for permanent storage. The remaining sandy material then passes through a series of differently sized spirals which separate the HMC from the lighter quartz sand particles. The separation process is based on the differences in densities (the various particles all have slightly different specific gravities (relative density – SG). A HMC loading station will be established adjacent to a positive displacement pumping station. HMC will be pumped via a pipeline to the existing MSP at the Namalope site (Plate 2.2).

All HMC from the Nataka site will be processed at the existing MSP at Namalope and the heavy mineral products stored at the same site prior to being shipped to market. Tailings from the MSP will continue to be disposed of at the Namalope site as described in the approved Operational Environmental Management Plan (2017). There will not be any need for changes to infrastructure or processes at that facility.

The storage, loading and transport of product will take place at the existing operation, and forms part of that licenced operation. Therefore, as this does not form part of this ESHIA process it is not discussed further.

Plate 2.1: View of the existing Moma Mineral Sands Wet Concentration Plant (WCP) B in the Namalope flats.

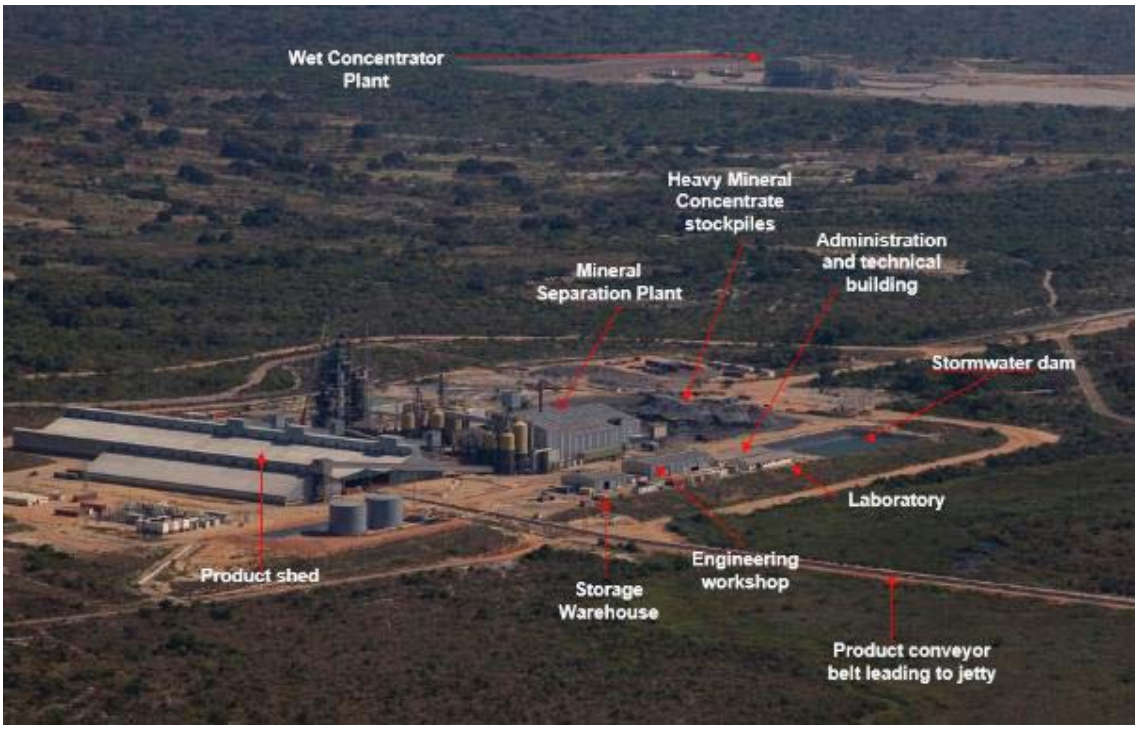


Plate 2.2: Aerial view of the existing Moma Mineral Sands project Mineral Separation Plant (MSP).

2.3 Dozer Trap Mining

Because of the safety requirement to have a lower dune face height, and the generally smaller mining units, the Front-end Loader (FEL) mining system that was investigated as an option will be more complicated than dozer mining (more infrastructure and more HME in the field). FELs will also require excavator or dozer support. Dozer mining is preferred because it has more certainty of throughput in the Nataka material and will require a simpler system.

Ore is fed into the dozer feed hopper using dozers, and a feeder extracts the ore from the dozer feed hopper onto a vibrating screen that removes oversize material. Water is added to the screen to assist the screening process, and the oversize from the screen discharges onto a stockpile that is periodically removed by mining operations. The underflow of the screen gravitates into a sump where additional water is added to the desired density for the ore to be pumped to WCP-A via a series of skid mounted slurry transfer pumps. The number of slurry booster pumps in series is based on the pumping distance from the dozer trap mining units to the WCP-A.

Process water is supplied to the dozer trap mining unit from the WCP-A pond using a vertical spindle water pump located on the new WCP-A feed preparation module, from where it is transferred to a series of booster pumps, the number being subject to the distance of WCP-A from the dozer trap mining units.


Plate 2.3: Dozer traps located side-by-side.

2.4 Hydraulic Mining

Five identical hydraulic mining units have been included in the Nataka hydraulic mining design, with four units operational and the fifth as a back-up. Each hydraulic mining unit comprises of three high pressure water pumps that supplies four hydraulic mining guns with high pressure water (three guns will be operating at a time) that is sprayed onto the dune face. The mined slurry will gravitate to a ROM slurry sump and pumping system with a number of slurry booster pumps in series. Two ROM slurry sumps and pump trains have been included in the design and the number of slurry booster pumps in operation depends on the distance of the hydraulic mining operation from the WCP-A.

Process water is supplied to the hydraulic mining units from the WCP-A pond using a vertical spindle water pump located on the new WCP-A feed preparation module, from where it is transferred to a series of booster pumps. Two water supply systems are included in the design.


Plate 2.4: Hydraulic mining.

2.5 In-path Tailings Storage Facility

Two primary options for slimes deposition were considered, namely continuous slimes paddocks and long term TSFs. Test work indicated that Nataka slimes consolidate at a very

slow rate. Dedicated TSFs for slimes were therefore recommended over in-path paddock deposition. However, in some specific situation in-path paddocks may still be required, for example when mining in particularly high slimes areas.

To minimise the requirements of wall construction several valley sites have been considered. Only four valleys are large enough to contain the 20-year slimes produced from mining the Nataka deposit but were discarded either because of their severe community and environmental impacts, or for being too far from the mining area. Isoa valley is the preferred option for the TSF, subject to the findings of a separate ESHIA.

The Isoa Valley TSF will be used for the first 10 years of mining, whereafter in-path TSF(s) will be used. Since this facility is only needed after about 10 years of mining, it has not been designed to the same level of detail as the Isoa valley TSF but is based on similar design criteria. It is also possible that more than one in-path TSF will be required. The need for this will be determined during the detailed design phase. The principle of in-path TSFs are that it stores a large part of the slimes below natural topography, which reduces the failure risk associated with TSFs. It has also been sized to sustain the remainder of the 20-year slimes that does not fit into the Isoa valley TSF

Mining, concentration and tailings disposal will occur as a continuous process. These fall into two categories, the coarser sand (predominantly quartz) and the finer slimes (predominantly clay). The only additives to the material prior to deposition as tailings will be water and a biodegradable flocculent (settling agent). Tailings will be placed in an off-mine path tailings facility as well as backfilled within the mined areas. A tailings facility is necessary as an initial void must be created prior to being able to deposit tailings back into the mined-out areas and as a storage area when the areas being mined are not deep enough, or too steep, for effective slimes backfill.

Coarse tailings will be used to construct a cyclone sand dam to impound the tailings. This type of arrangement will require a starter dam built with borrow fill material to provide the initial slimes and water containment. A reclaim water pond would operate from the rear (upstream) end of the impoundment and as close as possible to the natural ground level. Water from the reclaim water pond would be recycled to the Wet Concentrator Plant (WCP) for re-use and/or released to the environmental providing that water quality is suitable for discharge.

Seepage from the sand dam will be collected from a collection sump located immediately downstream of the embankment toe. The water will be then pumped back to the WCP or discharged to the environment in extreme rainfall events downstream of the facility, depending on water quality. Inflows to the TSF facility include the following:

- Runoff from the non-diverted natural catchment area upgradient of the TSF impoundment.
- Direct precipitation on impounded slimes and decant water pond.
- Net decant water from the deposited slimes (estimated as the difference between the water coming with the slurry slimes minus the entrained water with the slimes mass).

Outflows from the TSF facility include the following:

- Evaporation from the impounded slimes and decant water pond.
- Decant pond pumped outflows.

2.6 REHABILITATION

As the mining face advances, the mined area is backfilled to a level similar to the pre-existing land surface. Once the pit is backfilled, and after the material has dried, the surface is covered with topsoil stripped from the mining face as it advances. The goal is to immediately remove topsoil from ahead of the mine path and spread it over recently mined areas to avoid any topsoil stockpiles, as this topsoil is already naturally seeded with a variety of native grass and herbaceous species, as well as bulbs and geophytes, that remain viable and rapidly germinate on the recontoured land surface. This facilitates the rehabilitation process. Where possible, rehabilitation will be initiated immediately once the mining machinery has moved onto the next mining block (refer to Figure 2.2).

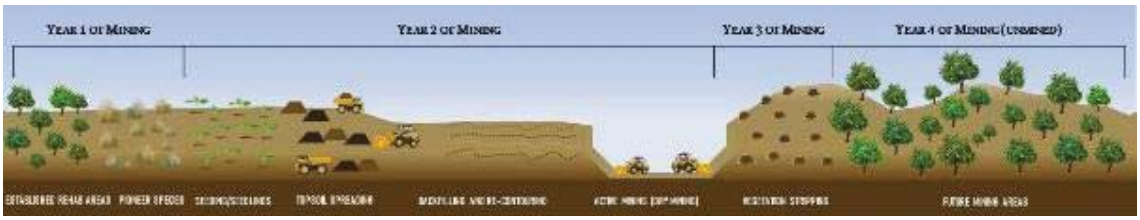


Figure 2.2: The rehabilitation process.

A detailed rehabilitation programme will be developed for the proposed project and submitted to MTA as part of the ESHIA documentation. The rehabilitation of terrestrial ecosystems will essentially follow, and build on, the approach adopted at Namalope and Pilivili.

2.7 PROJECT INPUTS AND OUTPUTS

2.7.1 Water Supply

It is estimated that the project will use approximately 2,000 m^3/hr (1,200 m^3/hr for Wet Concentration Plant - WCP A and 800 m^3/hr for WCP B) of water staggered over a period of 20 years. Water will be obtained from Lake Mavele, boreholes at Namalope, surface water streams at Nataka and groundwater within the deposit site.

2.7.2 Energy Requirements

Power required for the proposed operations will be distributed from an existing substation via 110 kV or 22 kV powerlines. The estimated power requirements for the project is calculated to be a maximum of 375 kWhrs.

2.7.3 Pipeline for the pumping of HMC to the existing Namalope MSP

An overland pipeline will be constructed from the mine site to the existing MSP at Namalope in order to return the HMC produced at Nataka to the Namalope MSP for final processing.

The carbon steel pipeline will be installed directly on the land surface to avoid the need for expansion loops, guides and anchors as the pipeline is free to move laterally to compensate for thermal expansion. Soil mounds at regular intervals along the line will restrain the line from excessive movement.

2.7.4 Employment Opportunities

A total of 637 individuals will be employed during the construction phase and 90 individuals will retain employment during the operation phase (**Error! Reference source not found.**).

Table 2.1: Maximum number of individuals that will be employed during each phase.

TYPE	CONSTRUCTION PHASE	OPERATION PHASE
Skilled	67	20
Semi-Skilled	134	50
Unskilled	472	20
Total	**637**	**90**

During the construction phase, semi-skilled workers will be sourced from local villages; skilled workers will be sourced mainly from contracting companies; and supervisory and management positions will generally be recruited from outside the local villages. Current operating employment will be maintained once the plant transfer is completed.

2.8 RATIONALE FOR THIS DEVELOPMENT

The heavy mineral ore bodies of Namalope and Pilivili, located in the Nampula Province currently being mined by Kenmare are a finite resource and will be mined out in the next 5 to 7 years. Kenmare therefore need to relocate the existing mining operations to the Nataka deposit, which is located approximately 8 km south-west of Namalope, within Kenmare's existing concession. The relocation of the mining operations is required to ensure that the provision of feedstock to maintain the current production rate of 1.2 million tonnes of ilmenite plus the co-products zircon and rutile can continue.

Mozambique is a developing country in southern Africa that has been steadily rebuilding its economy, civic institutions and social infrastructure since ending a 16-year civil war in 1992. Despite the impressive economic growth over the past decade, and the forecasts for continued economic growth, Mozambique still faces some significant challenges. It ranks 181 out of 189 countries on the 2019 UNDP Human Development Index and approximately 60% of the population of 23.7 million live on less than $USD1.25/day. This puts the country in the low human development category.

Mozambique is experiencing a period of economic growth due to recent discoveries of predominantly gas, coal, rubies and graphite. It is envisaged, and hoped by many, that this

growth will be achieved in a manner which is beneficial to all of Mozambique's citizens; and will permanently elevate the country from being amongst the World's poorest. The principal driver by which this growth is to be achieved is through foreign direct investment i(FDI) nto the resources and mineral sector.

The expansion of the Kenmare operations to the Nataka site will assist Kenmare to continue employing local people and Mozambique nationals, as operations will continue, and mine closure would not be required. In addition, the construction phase of the proposed project will also result in a limited number of additional employment opportunities within the general project area. The proposed development will also ensure Kenmare is able to continue with its current levels of tax payments and will continue to implement various Corporate Social Responsibility projects to uplift the project affected communities.

2.9 PROJECT ALTERNATIVES

2.9.1 Fundamental Alternatives

Fundamental alternatives are developments that are totally different from the proposed project and usually involve a different type of development on the proposed site, or a different location for the proposed development.

A different type of development: Since the core business of the project developer is mining and as the surrounding areas are already being utilised for this purpose, the fundamental alternative of a development other than mining is therefore technically not feasible in this instance. For this reason, no fundamental alternative to the proposed development will be considered.

A different location: It is not possible to locate the proposed mining area in a different location, as the specific area has been selected based on suitable mineral grades that occur in sufficient quantity too allow for commercial exploitation. Alternative areas within the general project area have already been mined or might be mined in the future. Consequently, a different location is not a viable alternative and cannot be assessed.

2.9.2 Incremental Alternatives

Incremental alternatives are modifications or variations to the design of a project that provide different options to reduce or minimise environmental impacts and maximise benefits. There are several incremental alternatives that can be considered, including the design or layout of the activity, technology to be used in the activity, and the operational aspects of the activity.

Design:
Several design alternatives have been assessed as part of the PFS undertaken for the proposed project. These are further elaborated on below:

Mining Method

Dredging

Dredging is generally the most cost-effective mining method for mineral sands. A common mining strategy is to maximise the dredging rate, and to use supplementary mining as a top-up and plant feed blend. Because of its flexibility, supplementary mining is also generally applied in areas that are difficult to dredge.

A concern with the above strategy is that the Nataka material is anticipated to be difficult to dredge, as it consists of relatively high dunes (~35 m) that have high slimes (~15%), and the material is not free flowing. This can create a hazardous dredge face as increased slump sizes increase the risk of damaging the dredge or creating waves in the pond. In addition, there is also a harder layer (potentially weakly cemented) up to 5m above the natural ground water level. Unless this layer can be kept below pond water level, a maximum safe dredge of 5 m above pond level is recommended. The maximum dredging depth is 12 m for WCP-A but using a long-term average of 10 m results in a total maximum face height of 15m.

With the total dredging face constrained to 15 m in more competent material, the mining model predicts a throughput of less than 1,400 tph for both dredges combined. Historically, the dredging cost was around 0.37 $/t (not considering rehabilitation). At the reduced throughput, it is anticipated to be around 0.52 $/t. Despite this increase in unit cost, it is still the most cost-effective mining method.

Despite the anticipated throughput loss and increase in cost, dredging was selected as it has the following advantages:

- It can most effectively recover the high-grade ore that is present below the natural ground water level;
- It is the lowest operating expenditure (OPEX) mining method; and
- Having a dredge pond maintains the overall mining configuration Kenmare is experienced in. The configuration keeps the plant close to the mining and backfill faces, thus minimising pumping costs. It also provides opportunity for interventions like paddock thickeners and potentially paddock slimes storage to relieve the loads on the TSF.

Supplementary Mining

With a total combined ROM requirement of around 4,000 tph the supplementary mining rate needs to be around 2,600 tph. The area for supplementary mining is a bench in front of the dredge path (at least for the first part of the project life), because:

- It acts as a mechanism to reduce the 35 m dune to less than the 15 m , currently considered safely dredgeable.
- The highest-grade material sits at the bottom of the dune and is generally under the ground water level. Supplementing from an area where dredging is not intended will incur high grade losses.
- There is pressure to mine to the maximum depth as fast as possible to maximise in-path tailings storage. Mining outside the dredge path will burden the system with more slimes without adding significant storage space.

The supplementary methods considered were front end loaders feeding slurry bins, dozer trap mining units, hydro-mining units and a bucket wheel excavator feeding a slurry bin.

The supplementary method is selected based on the following arguments:

The Bucket Wheel Excavator (BWE) mining system is flawed. The primary reason for not using BWE mining is the low reliability and availability. Because it has a low availability and needs to tie into a WCP, it is anticipated to only achieve 80% of the annual production of the other methods. This is a significant detriment to Kenmare's overall production and makes achieving 1.2 Mtpa ilmenite product much more difficult. Additionally, BWE layouts are inflexible and impose severe limitation on dredge path layouts. Finally, BWEs are generally known to be high CAPEX but low OPEX solutions. However, because of the need for dozer pushover and a slurry bin pumping to a moving plant, the OPEX advantage is lost. There is therefore no compelling argument to implement a BWE mining system.

A Hydraulic Mining Unit (HMU) has the best economics but major risks. The capital costs of hydro mining, and the operating costs are cheaper than other options, but there are risks that prevent it from being selected. The first is that the Nataka material is relatively competent, yet lower in slimes than the general range for hydro mining. Secondly, hydro mining has the highest power and water consumption of all the methods, both of which may incur significant additional costs as the operation-wide consumption exceeds certain levels. Studies are underway to understand the site-wide water consumption and consequences of further increases. Finally, a full hydro mining system in front of a dredge path cannot adapt to changes as fast as FEL/Dozer mining. For example, if the acceptable dredge face height is shown to be more or the pond must be lower, FEL/Dozer mining can adjust the elevation within a few hundred meters in front of the dredge face. Hydro mining will be established at a target elevation for kilometres ahead of the dredge face. Once certainty in the above issues are improved, hydro mining should be assessed as a cost reduction opportunity.

Dozers vs FELs. Because of lower face height and generally smaller mining units, the FEL mining system will be more complicated than dozer mining (more infrastructure and more HME in the field). FELs will also require excavator or dozer support to productively mine the competent Nataka material. Dozer mining is preferred because it has more certainty of throughput in the Nataka material and will require a simpler total system. A configuration for achieving 2,650 tph using two units of about 1,400 tph each can be achieved in front of the dredge path. Two dozer trap units side-by-side should be able to mine the width of a dredge path without lateral relocations and would be able to mine the total supplementary face as one benchPlate 2.1. In this configuration it should be possible to keep both dozer traps within reach of the plant with minimal need for boosters during steady-state operations.

Considering the above, dozer mining as well as hydraulic mining has been recommended as a reliable supplementary method. Both options will thus be considered further in the ESIA.

Tails and Slimes Management

Primary slimes deposition options

Two primary options for slimes deposition were considered, namely continuous slimes paddocks and long-term tailings storage facilities (TSFs).

WCP-A currently employs a continuous slimes paddock system at Namalope, which consists of three paddocks behind the dredge path. In this system coarse tails are used to construct paddock berms. A slimes / tails mixture is pumped to the oldest paddock, from where water is systematically decanted through newer paddocks to the dredge pond. The paddocks are eventually capped with coarse tails, on which slimes drying cells are constructed. Settled slimes are pumped from the paddocks to the drying cells to create more settling space in the paddocks.

Nataka's increased dune height and slimes grade would require up to nine paddocks, which will incur prohibitive pumping distances and costs. Upfront desliming and subsequent thickening can improve the settling performance and effective capacity of the paddocks. However, consolidation modelling has shown that the Nataka slimes consolidates very slowly. This is prohibitive for land return, as areas used for thickened slimes deposition can settle at more than one metre per year for over 20 years. This means a dedicated TSF for slimes deposition is preferred over in-path paddock deposition.

Layout: For mining projects layout alternatives are very limited, as the location of the mine is determined by the presence of the resource to be exploited. In this instance the layout of the mining path is based on geological exploration, which is used to define the extent of a commercially exploitable resource. The presence of the minerals therefore dictates the layout of the mine path. Further layout options might include for example the location of access roads and other associated infrastructure. Alternative layout options will be explored in the ESIA.

2.9.3 No-Go Alternative

According to the ESHIA Regulations, the option of doing nothing, not proceeding with the proposed development (i.e. the No Go Option), must be assessed during the ESHIA.

3 DESCRIPTIONS OF THE BIOPHYSICAL ENVIRONMENT

As part of the pre-feasibility studies for the Kenmare Nataka Project, a terrestrial ecological screening assessment was conducted on behalf of Kenmare. The findings informed this description of the biophysical environment.

3.1 CLIMATE

The project site is characterised by a tropical climate with two distinct seasons; a wet season that occurs from November to March, and a dry season from April to October.

The average annual temperature in Moma is 25.4°C. The warmest month is December (with an average temperature of 28.1°C) and the coolest month is July (with an average temperature of 21.7°C) (source: www.climatedata.eu). The area receives an annual average of 1,176 mm of rainfall. January receives the greatest rainfall and October receives the least rainfall during the year.

3.2 TOPOGRAPHY

The project area slopes from the south to north with a 20-30m change in elevation towards the Larde River (Figure 3.1). In the western portion, the site slopes from ±110 to 70m above-sea-level (asl) and in the eastern portion the site slopes from ±88 to 64m above sea-level (asl).

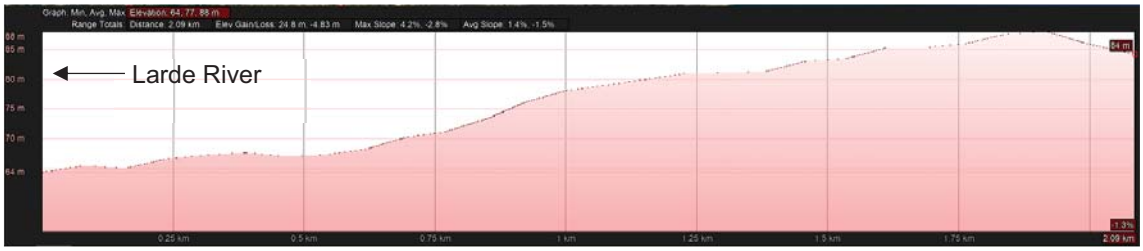


Figure 3.1: Gradient of the project area from north to south.

The project site is relatively flat from west to east with an elevation change of 25m across 10km, with the highest points averaging from 75m - 100m asl (
Figure 3.2). There are a number of tertiary rivers (±9) running across the project area from north to south, four of these rivers create steep elevation changes of 30-45m across 40m.

Figure 3.2: Gradient of the project area from west to east.

3.3 GEOLOGY AND SOILS

The Nataka deposit is a large accumulation of heavy minerals in the aeolian sediments of the Old Red Dune, centred approximately 8 km west of the Namalope Project. The mineralisation consists of thick, uniform zones of orange to red-brown silty sand. Geological evaluations indicate that while some zones of the deposit exceed 4% total heavy mineral (THM), the average grade of the deposit is 3.0% THM (Kenmare Nataka Pre-feasibility Study, March 2011).

The dunes consist of both hydrated (yellow) and dehydrated, oxidised (red) soils, the latter having greater iron oxide content (Plate 3.1 and 3.2). The dominant soil forms in the Nataka area are Fernwood (the grey and pale brown sands) on the lower slopes, and Hutton (red sands) and Clovelly (brown sands with yellow subsoil) on mid and top slopes where the soil is sandy. The drainage areas have slightly heavier (mainly silt, but with some clay) soils. Clay lamellae (bands in which clay has accumulated) in the subsoil are likely to occur in areas which are wet for most of the year.

The sandy texture of the soils (particularly in the upper, rooting zone) has a dominating influence on the following physical properties of the soils:

- Low water holding capacity.
- Low cation exchange capacity (which in turn imparts a low fertility to the soil).
- Rapid permeability.
- Poor cohesion between grains which makes the soil susceptible to erosion.

Plate 3.1: Cassava field on oxidised red sands.

Plate 3.2: Cassava field on hydrated yellow sands [Note drainage line in the background].

3.4 HYDROLOGY

The Nataka project area includes several tertiary tributaries that flow into one of the two main secondary tributaries of the Larde River. These linear drainage features mainly slope from south to north and drain the site into the Larde floodplain (Plate 3.3). In the southern extent there is an isolated drainage line that flows seaward. The floodplain of the Rio Larde is a major geomorphic feature to the north but falls outside the boundary of the deposit area (Figure 3.3).

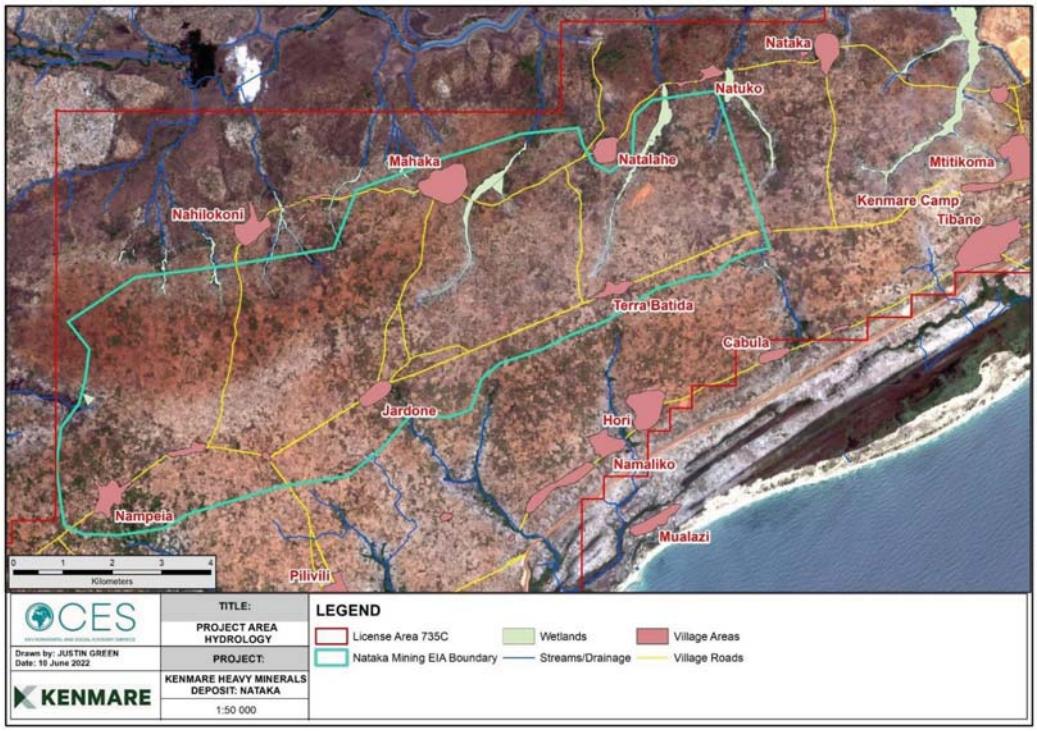


Figure 3.3: Hydrology of the project area of influence.

There are several wetland systems within the project area. Although a number of these wetlands have been impacted by vegetation clearing largely for agricultural purposes, they still support considerable biodiversity and provide a range of valuable ecosystem services such as water supply for domestic use (washing and drinking) and subsistence agriculture. Most of these wetlands can be classified as Valley Bottom Wetlands and are typically relatively shallow gradient wetland systems located along valley floors. Un-channelled Valley Bottom (UVB) wetlands, which typically lack a river channel running through the unit also occur (Ollis *et al*., 2013 in Wetland Consulting Services (Pty) Ltd, 2021). They are characterised by the absence of distinct or continuous channels within the wetland section. Water inputs to these systems comprise diffuse flows, groundwater contributions and seepage from adjacent valley side-slopes. Valley bottom wetlands are typically groundwater fed, with baseflow, and in Nataka have seasonal to perennial surface flow, emerging from groundwater seepage at the heads and margins of the systems all along their length. Surface runoff from the surrounding catchment area (terrestrial soils) is not expected to be a major contributor to flow in these systems due to the sandy nature of the catchments and high infiltration rates of the surrounding sandy soils, though some surface runoff does occur on occasion (Wetland Consulting Services (Pty) Ltd, 2021).

Plate 3.3: Drainage line which flows north towards the Larde River Floodplain, in proximity to Mahaca Village.

An additional area of wetland occurs within a 1 km buffer of the project area. Most of this wetland habitat occurs downslope of the project area. These are all naturally Un-channelled Valley Bottom wetlands, though short sections of artificially channelled reaches occur in heavily cultivated areas. Seeps occur as narrow foot-slope strips along the edges of the Valley Bottom Wetlands and reflect areas of fluctuating groundwater emergence, or in small, localised patches more extended groundwater emergence (Wetland Consulting Services (Pty) Ltd, 2021).

Common plant species observed within the wetland habitat of the project area include *Paspalum species, Cyperus articulates, C. prolifer, Imperata cylindrica, Leersia hexandra, Pycreus polystachyos, Panicum parvifolium, P. repens, Leersia hexandra, Eragrostis ciliaris, Cyclosurus interruptus, Heteropogon sp., Pennisetum sp., Nymphaea nouchali, Typha capensis,* and *Phragmites australis*, amongst others (Wetland Consulting Services (Pty) Ltd, 2021).

The main hydrological processes identified within the sub-catchments of the project area include:

- Rainfall
- Infiltration
- Groundwater Recharge
- Evapotranspiration
- Groundwater return flow; and
- River discharge.

3.5 LAND USE

The soils strongly influence land use, which is dominated by cultivation in the traditional shifting pattern of rural Africa. As a result, a mosaic of exotic and indigenous fruit trees and crops cover the area, with small patches of the original indigenous Miombo woodland, forest or thicket remaining. The few isolated patches of miombo woodland are likely used for collecting plants and trees for firewood and construction materials. The soils have a very low water holding capacity. While soil fertility is a significant factor affecting crop productivity, the combination of adverse climatic conditions and low water holding capacity of the soils is important as it reduces yields significantly.

The common tree crops grown are mango and cashew with some banana and papaya in the drainage lines. Oranges and mandarins, as well as coconuts, are grown in the villages. Many of the cashew trees remain as remnants in woodlands and outside the current cultivated areas, but these are generally low yielding. Cassava is the dominant field crop grown (Plate 3.1), and other main crops include maize, groundnut and Njugo bean (Feijao joco, Voandzea sellowiana). Some people are also likely to grow pigeon pea (Cajanus cajan), cow pea (Vigna sp.) sugar cane, sweet potatoes, pineapples and vegetables such as onions, tomatoes, garlic, potatoes, etc.

All agricultural work is done by hand, with fire used to clear unusable plants. Land is allocated by the village secretary, and each family makes use of a few hectares. Usually, a piece of cleared land is used for three to four years before it is abandoned. Between one and four hectares of crops, but mainly cassava, can be cultivated at a time. Once abandoned it returns to secondary savanna, to be cultivated again after an unknown rest period. No use is made of fertilisers or organic materials to build up the soil fertility. The organic matter in the soils of the area is concentrated in a thin (100mm) top layer.

3.6 VEGETATION

The vegetation present within the study area is a mosaic of Miombo Woodland and transformed land which is comprised of machambas. Areas that have been transformed have been mapped for the sake of completion, but no further descriptions are provided (Figure 3.4). Due to the past and present shifting cultivation practices described above, a mosaic of vegetation types occur. A vegetation classification has not been done at this stage, but based on a preliminary field visit the following communities were identified:

- Secondary savannah – most abundant
- Miombo woodland/thicket – isolated patches
- Vegetation of drainage line – restricted to drainage lines
- Floodplain grassland – restricted to the Larde floodplain area.

The Miombo woodland occurs as fragmented patches throughout the site. Based on the species composition this appears to have been closed Miombo Woodland or even forest prior to clearing commencing by local communities. The patches of Miombo Woodland typically have a canopy cover of 50-75% with an understory of grass species and herbs (Plate 3.4). Tree height ranges from 3-4m with emergents reaching up to 6m.

A total of 145 species from 48 families were recorded within the project area during the terrestrial ecological screening assessment. Of the 145 recorded species, nine (9) are classified as Species of Conservation Concern (SCC) including *Afzelia quanzensis* (NT), *Bosqueiopsis carvalhoana* (near-endemic), *Brachystegia oblonga* (endemic, CR), *Catunaregam stenocarpa* (near-endemic), *Glyphaea tomentosa* (endemic, LC), *Grewia transzambesica* (endemic, LC), *Ozoroa obovata* (near-endemic, LC), *Paropsia braunii* (NT), *Vitellariopsis* cf. *kirkii* (VU).

There are no dominant species that characterise Miombo Woodland, however common species throughout the site include shrubs and trees such as *Xylotheca tettensis, Ozoroa obovata, Annona senegalensis, Xylopia gracilipes, Ancylobothrys petersiana, Carissa macrocarpa, Commiphora serrata, Grewia sulcata, Pteleopsis myrtifolia, Rourea orientalis, Tetracera boiviniana, Hymenocardia ulmoides, Cassia afrofistula, MIllettia stuhlmanii, Phyllocosmus lemaireanus, Vitex doniana, Afzelia quanzensis, Albizia adianthifolia, Dalbergia nitidula, Strychnos madagascariensis, Strychnos spinosa, Grewia transzambezica, Ochna mossambicensis, Antidesma vernosum, Securidaca longepedunculata, Pavetta decumbens, Tarenna junodii, Blighia unijugata, Deinbollia oblongifolia* and *Manilkara concolor.*

Plate 3.4: Patches of miombo woodland found within the project site.

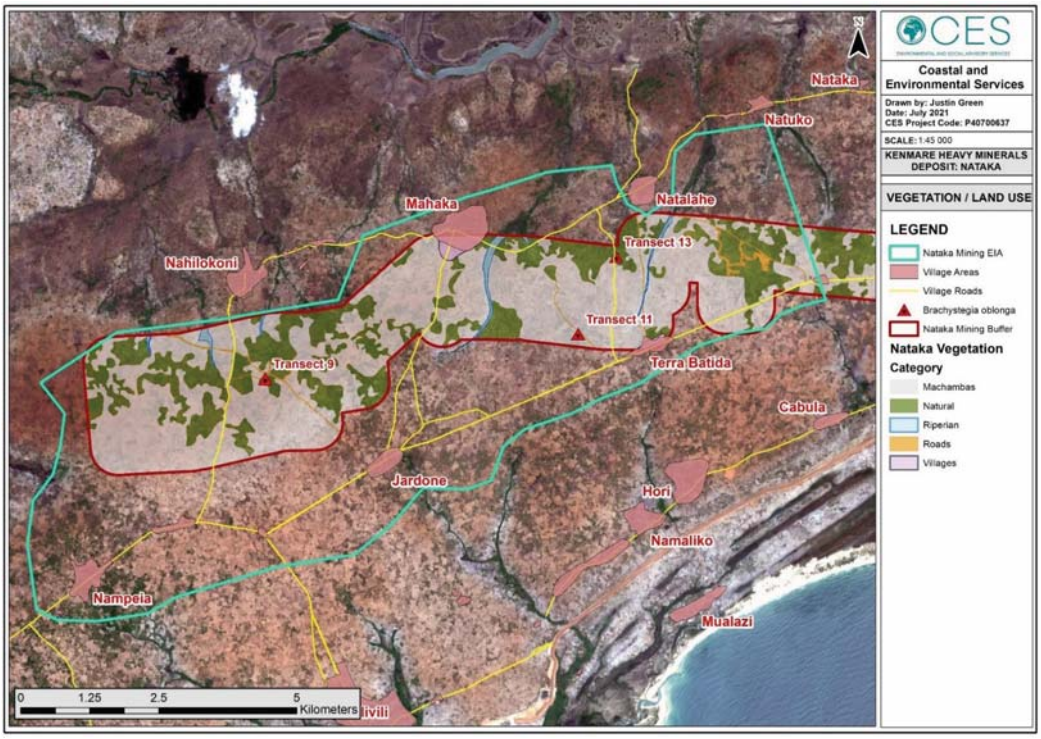


Figure 3.4: Preliminary vegetation map of the proposed study area.

3.7 FAUNA

Mozambique has approximately 1,196 terrestrial vertebrate faunal species of which 726 species are birds (61%), 214 species are mammals (18%), 171 species are reptiles (14%) and 85 species are amphibians (7%) (MITADER, 2015).

3.7.1 Herpetofauna

Reptiles in Mozambique show a higher diversity in the central and southern regions, the "hotspots" for endemic reptiles are found to occur east of the Great Inselberg Archipelago in Zambézia Province, in Bazaruto and Inhambane Archipelagos, along the coast of Gaza and Maputo Provinces and in the centre of Sofala Province (Schneider *et al.*, 2005). Estimates of endemic reptile species found to occur in Northern Mozambique ranges between 1 to 11 species. For amphibians there is a lack of data to determine the diversity hotspots in Mozambique (Schneider *et al.*, 2005).

According to Farooq and Conradie (2015) the scientific knowledge of herpetofauna diversity in the northern Mozambique region is poor. They attribute this to the country's history of a long civil war which rendered much of the region physically inaccessible and thus has been under-sampled and the number of herpetofauna species is likely underestimated. In support of this a study conducted by Ohler and Frétey (2014) used molecular and behavioural characteristics of samples from surrounding regions and found several new taxa to occur in Africa, thus more species are found to occur in the region than had been previously been reported.

There is a discrepancy when it comes to the actual number of herpetofauna species in Mozambique, with each source consulted citing different species counts (**Error! Reference source not found.**).

Table 3.1: Number of herpetofaunal species in Mozambique according to various sources.

Herpetofauna	AmphibiaWeb database (2016)	Reptile Database Utez, 2016	MITADER 2015	Farooq & Conradie 2015	Schneider *et al.* 2005
Amphibians	86	-	85	69	84
Reptiles	-	234	171	221	280

Threats to herpetofauna included anthropogenic activities such as using reptile and amphibians as food sources, the use of their skin for medicinal purposes, habitat destruction and collecting certain species for the pet trade (MITADER, 2015).

Three amphibian species were recorded from the rivers in the project area including the East African Puddle Frog (*Phrynobatrachus acridoides*), Dwarf Puddle Frog (*Phrynobatrachus mababiensis*) and Dwarf Grass Frog (*Ptychadena taenioscelis*).

Four reptiles were observed onsite, the Variable Skink (*Trachylepis varia*) (Plate 3.5), Flathead Leaf-toed Gecko (*Hemidactylus platycephalus*), Intermediate Plated Lizard (*Gerrhosaurus intermedius*) and Puff Adder (*Bitis arietans*).

Mozambique hosts 11 threatened amphibian species including two critically endangered, five endangered and four vulnerable species. Mozambique also hosts six endemic species and one data deficient species (IUCN, 2021). None of these species has a distribution range which includes the project area. Mozambique host 21 reptile species of conservation concern (SCC), including 14 threatened (2 CE, 5 EN, 7 VU) and seven near threatened reptile species.

Mozambique also hosts 26 endemic species and six data deficient species (IUCN, 2021). Of these only the Zambezi Flapshell Terrapin (Cycloderma frenatum) (EN) has a distribution which includes the project area (van Dijk, 2016). Since the Zambezi Flapshell Terrapin is listed as endangered, has a distribution range that includes the site and there is suitable habitat present on site (confirmed during the site visit), the faunal survey will determine whether there is evidence of this species on, or directly adjacent to the site.

Plate 3.5: Variable Skink (*Trachylepis varia*) recorded from the project area.

3.7.2 Mammals

According to the National Strategy and Action Plan of Biological Diversity of Mozambique (MITADER, 2015), 214 terrestrial mammal species occur in Mozambique. Conversely, Schneider *et al*. (2005) state that 271 mammal species occur in Mozambique. However, this value includes both terrestrial and marine mammals. Generally, large mammals are restricted to conservation areas. Three mammals were recorded from the project area.

Mole-rat mounds were found in several locations across the project area. Mole-rats are part of the Bathyergidae family and species with a distribution that includes the project area are the Silvery Mole-rat (*Heliophubius argenteocinereus*) and the Mashona Mole-rat (*Fukomys darlingi*). It is important to note that there have been several discoveries of mole-rat species new to science in recent years (Faulkes *et al*. 2017; TAG, 2012), thus this species as a whole has been under studied, especially in Mozambique. It is therefore recommended that the mole rat species is specifically assessed during the ecological assessment to be undertaken for the ESHIA to confirm the species currently occupying the site.

Gerbil tunnels were seen, and two gerbil species have a distribution that includes the project area. Bushveld Gerbil (*Gerbillliscus leucogaster*) and Gorangoza Gerbil (*Gerbillliscus inclusa*). It is therefore recommended that the species of Gerbil be confirmed during the ecological assessment to be undertaken for the ESHIA.

Spoor of a small carnivore was observed in the road. Given the small size it is expected to be a Genet, likely the Common Large-spotted Genet (*Genetta maculate*).

Mozambique hosts 32 mammal species of conservation concern (SCC), 19 threatened (1 CE, 7 EN, 11 VU) and 13 near threatened. Mozambique also hosts three endemic mammal species and 11 data deficient mammal species (IUCN, 2021). The project area is within the distribution range of three threatened, two near threatened and one data deficient terrestrial vertebrate mammal species. These are presented in detail below. This record includes the distribution range of the Black Rhino (*Diceros bicornis*) (CE) and the White Rhino (*Ceratotherium simum*) (NT). The IUCN SSC African Rhino Specialist Group (AfRSG) does not release detailed information on rhinos for security reasons, and only whole countries of occurrence are indicated on the range map. Thus, although the site 'triggers' the *Diceros bicornis* range only one individual has been sighted in Mozambique since the 2008 IUCN African Rhino Specialist Group (AfRSG) meeting (Emslie, 2020).

- **Leopard** (*Panthera pardus pardus*) (VU) has an incredibly wide range that spans across continents. They are found across sub-Saharan Africa to North Africa in Egypt (Stein *et al*. 2020). This is due to their wide habitat tolerance and highly varied diet. Habitats include woodland, grassland, savannah and mountain habitats, but they also occur widely in coastal scrub, shrubland and semidesert (Stein *et al*. 2020). It is unlikely that the Leopard occurs in the project area and if it does it is unlikely to support globally important concentrations of the Leopard and thus would not be considered to be a trigger for critical habitat under Criterion 1.
- Temminck's Pangolin (*Smutsia temminckii*) (VU) has a widespread distribution from south-eastern Chad, through South Sudan, much of East Africa and southern Africa. South Africa is estimated to have 16,329–24,102 mature individuals (Pietersen *et al*. 2016) but abundances in other regions of Africa are unknown. The population is

decreasing due to ongoing exploitation of this species for traditional medicine and bushmeat, with future population reduction estimated at 30–40% over a 45-year period. This species inhabits savannas and woodlands in low-lying regions, in areas with moderate to dense scrub, provided there is sufficient prey (ants and termites) as well as dens or above-ground debris in which to shelter. The Temminck's Pangolin habitat and prey is present in the project area (confirmed during the site visit). Local communities must be consulted as part of the Ecological Assessment and/or by Kenmare's social department to establish if this species occurs in the project site. Criterion 1 of the guidance notes on PS6 of the IFC Performance Standards states that "Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in GN72(a)" may also be a trigger for critical habitat. Although the Pangolin is listed as VU on the IUCN red data list, it seems unlikely that the potential loss of these individuals at the Nataka site (if present) will result in a change of the IUCN Red List Category, as this species has a relatively large distribution area. Although unlikely to be a trigger for critical habitat, it is recommended that the presence of this species is further investigated as part of the faunal assessment to be undertaken for the project, as it is a CITES listed species.

- African Clawless Otter (*Aonyx capensis*) (NT) is widely distributed from the Western Cape in SA northwards throughout East Africa and stretching from Senegal to Ethiopia (Jacques *et al*., 2015). African Clawless Otters are predominantly aquatic and seldom found far from water, inhabiting forests, grasslands and wetlands. Freshwater is an essential habitat requirement, and they only occur in marine habitats where there is access to fresh water (Jacques *et al*., 2015). African Clawless Otters have been found in towns and cities and have been recorded utilising rivers as corridors to move through a city. They can occupy rivers with high pollution and eutrophication levels (Ponsonby, unpublished, 2018; Jacques *et al.,* 2015). The African Clawless Otter was recorded at the Pilivili site in August 2021 in the wetlands and coastal thicket habitat, thus it has been recorded in the general project area. In addition, habitat for this species exists in the project area (confirmed during the site visit). This species will not trigger critical habitat as it is Near Threatened and has a large distribution range.
- Light-winged Lesser Bat (*Scotoecus albofuscus*) (DD) has been widely, but patchily recorded over much of West Africa and East Africa, with some records from Central Africa (Jacobs, 2019). The range is poorly known, and the species might be more widespread. Little information is available on the population abundance, size of this species and habitat but it has been recorded from woodlands, and probably also occurs in dry savanna habitats (Jacobs, 2019). Light-winged Lesser Bat is classified as data deficient (DD). The difficulty with DD species is that there is no available information on these species in terms of population size, habitat and distribution (i.e., rare, endemic or range restricted species) to determine its conservation (threat) status. This could present an opportunity for Kenmare to provide valuable information to science. It should be noted that the field of bats is extremely specialised, and thus should Kenmare opt to make a contribution, a bat survey would need to be conducted to determine its presence on site.

A detailed ecological impact assessment, inclusive of trapping, night-time surveys and interviews with communities will need to be conducted to obtain additional information on the mammal species listed above, and in particular the Temminck's Pangolin.

3.7.3 Birds

According to BirdLife International (2021), a total of 674 bird species occur within the project area, but Lepage (2016) accounts for a much higher diversity, listing 747 species (including rare vagrants and accidentals). Ornithological studies for the southern and central areas of Mozambique are well documented (Parker, 1999; 2005a; SABAP2). However, very few ornithological studies have been conducted in northern Mozambique, particularly in the provinces to the north of the Zambezi River. Regardless of the discrepancies between published species lists, Mozambique undoubtedly has a rich diversity of avifauna. It is estimated that approximately 319 bird species are likely to occur within the Greater Moma Region where the project area is located. The field survey of the Pilivilli project site (Branch, 2017) recorded 183 bird species and the majority are likely to occur within the project area.

During the field survey 44 bird species were recorded. Of note is the presence of predatory birds including the African Goshawk (*Accipiter tachiro*), Black-chested Snake Eagle (*Circaetus pectoralis*), Black-winged Kite (*Elanus caeruleus*) and the endangered Martial Eagle (*Polemaetus bellicosus*).

Species recorded in the Miombo Woodland habitat include the Crowned Hornbill (*Lophoceros alboterminatus*), Southern Red-billed Hornbill (*Tockus rufirostris*), Gorgeous Bushshrike (*Telophorus viridis*), Square-tailed Nightjar (*Caprimulgus fossii*), Brown-hooded Kingfisher (*Halcyon albiventris*), Amethyst Sunbird (Chalcomitra amethystine), Lilac-breasted Roller (*Coracias caudatus*), Little Bee-eater (*Merops pusillus*), African Hoopoe (*Upupa africana*), Arrow-marked Babbler (*Turdoides jardineii*), Green-winged Pytilia (*Pytilia melba*) and Red-faced Mousebird (*Urocolius indicus*).

Common birds in the Miombo Woodland vegetation include the Black-crowned Tchagra (*Tchagra senegalus*), Brown-crowned Tchagra (*Tchagra australis*), Sombre Greenbul (*Andropadus importunus*), Emerald-spotted Wood Dove (*Turtur chalcospilos*), and Tropical Boubou (*Laniarius major*).

The machambas hosted smaller birds such as Bronze Mannikins (*Lonchura cucullate*), Blue Waxbill (*Uraeginthus angolensis*) and Tawny-flanked Prinia (*Prinia subflava*) as well as the Southern Fiscal (*Lanius collaris*), Dark-capped Bulbul (*Pycnonotus tricolor*) and Pied Crow (*Corcus ablus*).

The large wetland area north of Nataka Village hosted two Saddle-billed Storks (*Ephippiorhynchus senegalensis*), two Stripped Pipits (*Anthus lineiventris*) and several Collared Pratincoles (*Glareola pratincole*). This wetland is significant in extent and could potentially host large populations of waterbirds during the wet season.

Mozambique has 16 Important Bird Areas (IBA) covering an area of 1 708 800 Ha. The IBAs provide refuge for 13 globally threatened species, 15 biome-restricted species, and 10 range-restricted species (BirdLife Int., 2021). The closest IBA to the project area is the Moebase Region (40, 000ha) located approximately 80km south-west of the project area.

Mozambique hosts 29 globally threatened and two country endemic species. The project area is within the distribution range of 11 threatened and seven near threatened species. The Cape Gannet is a coastal species and will not occur on site (Birdlife Int., 2018). The Martial Eagle (EN) was observed on site and the Pallid Harrier (NT) was observed 500m east of the project boundary.

3.8 PROTECTED AREAS

According to the Integrated Biodiversity Assessment Tool (IBAT), there are a total of fifty-eight (58) protected areas in Mozambique, covering a total land surface area of 233,249 km^2. A portion of the project area falls within the Primeiras and Segundas Environmental Protection Area (APAIPS), one of the largest protected marine areas in Africa with a marine reserve of approximately 10,411 km^2. The APAIPS includes 10 islands, the strip of ocean between these islands and the shore, as well as several estuaries and rivers within the 19.3 km stretch inland. The management of Conservation Areas in Mozambique is primarily the responsibility of the National Conservation Administration (ANAC). However, management of the APAIPS is based on a participatory approach and incorporates government, communities, private sector, civil society and others (Biofund, 2022). The Management Plan for the APAIPS (Plano de Maneio da Área de Protecção Ambiental do Arquipélago das Ilhas Primeiras e Segundas 2014-2019) provides guidance on specific activities within the protected area to minimise threats to biodiversity and identifies various zones within the Environmental Protection Area with different levels of environmental protection. The document indicates that there are a number of approved mine concession areas within the designated area and includes specific guidance on how such activities should be managed.

Other than the APAIPS, the nearest protected area in proximity to the project area is the Gile Game Reserve, located approximately 53 km north-west of the project area.

4 DESCRIPTION OF THE SOCIO-ECONOMIC ENVIRONMENT

4.1 LOCAL ADMINISTRATION

Mozambique's local government is comprised of both formal and traditional authorities. District Administrators fall below the provincial level government and are responsible for overseeing a number of Chiefs of Administrative Posts (Synergia, 2016). Administrative posts are divided into localities, and each of these are headed by a Chefe de Localidade (a chief responsible for overseeing the locality and who reports to the Administrative Chief). Community leaders fall below the Chefe de Localidade and include both traditional leaders, selected based on traditional rules, and elected leaders. Figure 4.1: Local government structure.Figure 4.1 illustrates the local government administrative structure.

In Mozambique land is normally held by the Government, although the Government recognises the role of customary tenure. The land is therefore still largely regulated and controlled by local chiefs and elders.

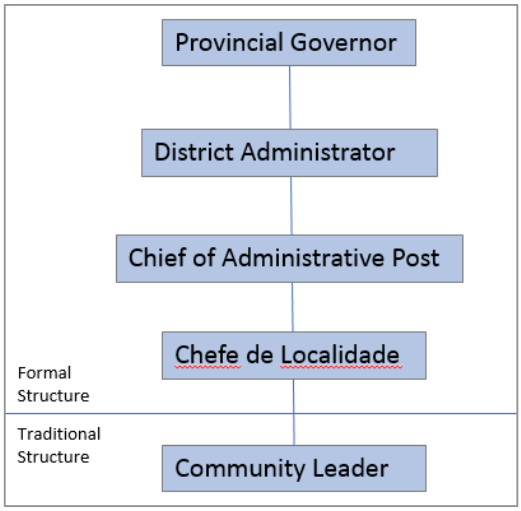


Figure 4.1: Local government structure.

4.2 PROJECT AFFECTED COMMUNITIES

Eight villages are located within and directly adjacent to the project's boundaries and access routes. The location of these communities in relation to the project and its related infrastructure is illustrated in Figure 4.2. The villages are:

- Nampeia
- Nahilokoni
- Mahaka
- Natalahe

- Natuko
- Nataka
- Terra Batida
- Jatoni

These villages will all be directly affected by the project and are referred to as project affected communities (PAC).

4.3 DEMOGRAPHICS

Nampula province is the most heavily populated province in Mozambique, with a population of approximately 5,2 million (21% of the total population in Mozambique) according to the 2017 census undertaken by Instituto Nacional De Estatistica (INE). This figure rose from 4 million in 1997 which indicates a population growth of around 3% per year (Club of Mozambique, 2019; INE, 2020).

Based on recent monitoring by Nomad Consulting (2022), they concluded that the rapid development associated with Kenmare operations has resulted in changes to the population structure and demographics of the villages within and around the project area. While the study found that family structure and household size has not changed significantly over the last 10 years, the population growth rate for Nataka was significant, amounting to 2.1% between 2017-2021. According to the Governo Do Districto de Moma (2013), the population of Nataka in 2013 was 1,468, increasing to 1,600 in 2021. Nearby villages displayed a similar trend, with Mtiticoma and Thipane having an 11.3% and 6.6% population growth rate respectively. These increase are attributed to population influx by (1) Kenmare staff and family, (2) project contractors, (3) economic migrants, (4) intra-district movement, and (5) natural population growth. These trends are typical of areas with major developments in Africa.

According to Nomad Consulting (2022), approximately 60% of the population within and surrounding the project area is younger than 18 years of age.

4.4 HOUSEHOLD LIVELIHOODS, INCOME AND EXPENDITURE

Agriculture, fishing and forestry in Mozambique contributed 24% to the gross domestic product (GDP) in 2019 (Statista, 2020). It is therefore considered an important contributor towards the country's economy, especially subsistence agriculture which employs the majority of the country's workforce, particularly in rural areas.

Prior to the establishment of the mine, the employment opportunities within the project area were limited. The increase in employment opportunities associated with the establishment and operation of the mine has had positive spin-offs in the local economy and growth of local villages (Nomad Consulting, 2022).

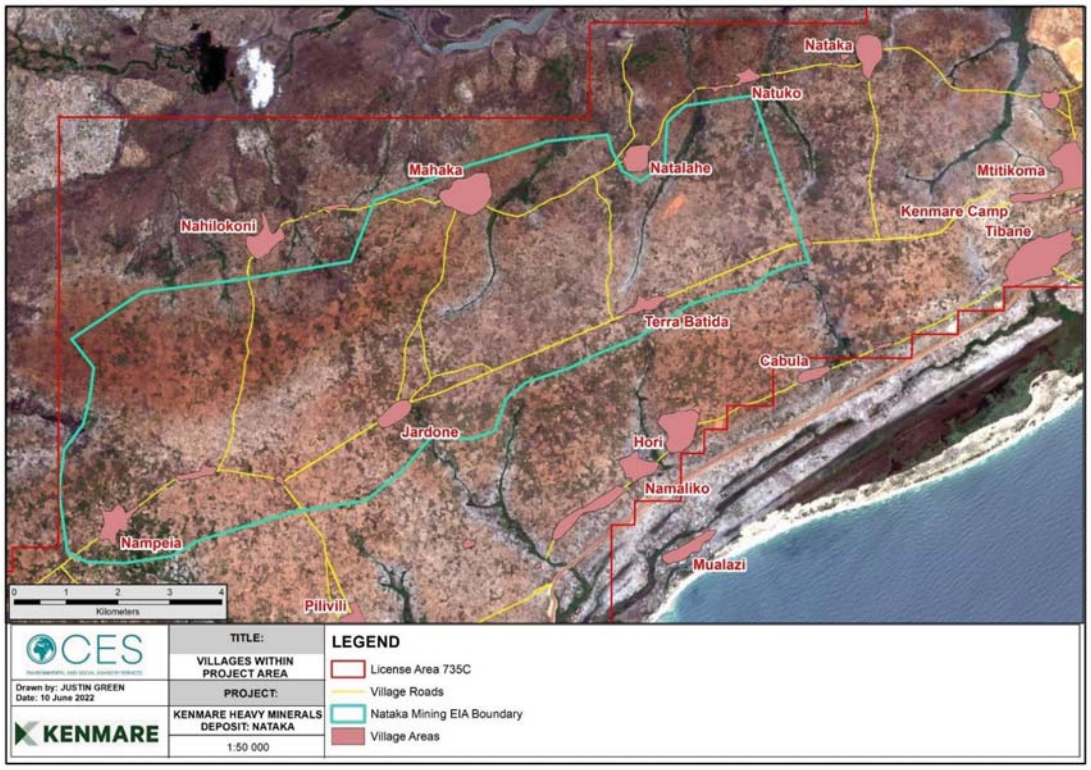


Figure 4.2: Villages identified within the project area.

Despite the increase in employment opportunities associated with Kenmare's operations, survival strategies and livelihoods are still largely dependent on local resources, with limited reliance on natural resources from further afield. The villages within the project area tend to rely predominantly on resource use and extraction at the local level. Although the environment is presently being degraded, from an ecological and species diversity perspective, the local population are still able to extract sufficient natural resources to sustain a subsistence way of life. The mine has however created a centre of employment and the villages surrounding the mine site provide substantial labour cadres. Wage income has gained importance within the broader project area as an alternative livelihood to subsistence-based agriculture.

The marked increase in cash income available has seen an increase in the demand for goods and services, and subsequently the markets to provide them. Although this is more marked in the villages in the immediate vicinity of the currently developed mine site, it also extends in a more limited manner to the villages in the Nataka area.

The Social and Resettlement Monitoring (Nomad Consulting, 2022), found that there has been an increase in the percentage of households claiming salaries as a source of income within the broader project area, increasing from 2.5% in 2017 to almost 12% in 2021. This might not be related to direct employment associated with mining operations, but rather the indirect increase in economic activity associated with the mine. The 2021 monitoring found that 65% of income from members within the broader project area was from the sale of agricultural and related products, while 11% was from the sale of fish, and 4.5% was from self-employment.

Household assets and expenditure are important indicators of household wealth (Nomad Consulting, 2022). Social monitoring within the broader project area undertaken between 2011 and 2014, indicated an increase in asset ownership which was most likely attributed to the increase in disposable income linked to the temporary employment opportunities created during the construction phase of the mine. The 2021 social monitoring indicated that asset holdings since the completion of the construction phase were either stable or had declined. Common assets include bicycles, motorcycles, televisions, cell phones, radios, handheld hoes and fishing nets (Nomad Consulting, 2022).

4.5 Education

Prior to the establishment of the mine, access to education was limited due to the lack of school facilities and educational materials. Historically, school facilities consisted of makeshift wattle-and-daub structures. Kenmare has built primary schools in Thipane, Mtiticoma, Naholoco, Nathaca, Matalahe, Pilivili, Mulimuni, and Thibane, as well as a polytechnic (technical training school) in Topuito. A programme to upgrade the Pilivili school to a secondary school is underway with some secondary classes already being offered (Nomad Consulting, 2022). Socio-economic data collected in the broader areas indicates that education levels have improved significantly since Kenmare's investment in education, as the number of students enrolled at local primary schools increases annually.

4.6 AGRICULTURE

Crops produced on the machambas surrounding the villages and towards the drainage lines are mainly maize, beans and cassava, with the latter being the staple crop in the project area, as it is for the surrounding area in general. Livestock bred for consumption in the project area is generally restricted to chickens, goats and ducks.

4.7 GRAVES

Graves are extremely important in the local cultural environment. Villages generally have one or more cemeteries located within its boundaries as well as on the outskirts thereof. Graves fall within the domain of the traditional authority, and traditional leadership is strongly reinforced around related issues. Graves and cemeteries within the project area will have to be documented in order to make recommendations about protecting or moving graves likely to be disturbed by mining activities. The current relocation process employed by Kenmare for the Namalope and Pilivilli areas are well established and resulted in the successful, and generally conflict free, relocation of these cemeteries.

5 STAKEHOLDER AND COMMUNITY ENGAGEMENT PROCESS

5.1 INTRODUCTION

The Public Participation Process (PPP) involves consultation with the wider public. The process facilitates the dissemination of information about the project and identification of indirectly and directly affected I&APs.

The PPP will be outlined in detail in the PPP Report which will provide accounts of all the meetings held during the EPDA phase of the ESIA. It will then be expanded after the EIR public disclosure meetings to report on the full engagement process. The final PPP document with all the relevant minutes of the meetings and attendance registers will be submitted to MTA, together with the other full ESIA reports.

Through the PPP process all I&APs will be made aware of the project and its possible negative implications, and the process will assist them to understand the project and its potential benefits to them. A poorly executed PPP can result in disputes and disagreements between communities, the developer and government authorities and lead to the disruption of established social structures.

As part of this process, public consultation meetings will be organized where all I&APs are invited and will be provided with an opportunity to express and record their concerns, expectations and comments relating to the proposed project.

5.2 NATIONAL LEGISLATION

Stakeholder engagement is a legal requirement for Category A projects and MTA have prepared a Directive for the Stakeholder Engagement process published as Ministerial Diploma 130/2006 of 19 July. This is further reinforced by the new Regulations on Resettlement Process resulting from Economic Activities (Decree 31/2012, of 8 August). Article 13 of this Regulation points out the need to ensure Public Participation throughout the entire process of development and implementation of Resettlement Action Plans for projects.

The PPP phase of the ESIA will:

- Identify the stakeholders.
- Disseminate information to stakeholders.
- Manage a dialogue with the proponent of the activity.
- Assimilate and consider public comments received.
- Provide feedback in response to the outcomes of the dialogue and inputs to demonstrate how these have been taken into account in the design of the activity.

5.3 PUBLIC PARTICIPATION PROCESS

The main objective of the EPDA public consultation meetings is to disclose the main findings of the EPDA, present the potential impacts and risks identified at this time and explain the EIA process and what specialist studies will be undertaken.

Disclosure of both the EPDA and ESIA reports will comprise open public meetings in the surrounding villages and at the administrative centres of Larde and Moma and involve the following steps:

- Preparation of the list of stakeholders.
- Preliminary consultations with communities, government and non-governmental organizations.
- Submission of EPDA and ESIA to the relevant institutions and making the reports available for consultation before the public meetings.
- Preparation and delivery of invitation letters to relevant stakeholders.
- Realisation of public consultation meetings in the affected communities.

Prior to the public meetings, a draft of this EPDA document will be made available on a public website and hard copies will be distributed at key locations for the public to view. The details of the public meetings will be advertised in newspapers and on local radio stations.

6 PRELIMINARY ENVIRONMENTAL AND SOCIAL RISK ASSESSMENT

6.1 RISK ASSESSMENT METHODOLOGY

To guide the development of the ToR for specialist studies and the ESIA, a structured risk assessment approach was applied to identify environmental and social (E&S) issues and assess the significance of these issues. Risk was assessed by combining significance with the potential difficulty to mitigate issues, with "degree of difficulty to mitigate" interpreted in terms of effectiveness, practicality and cost effectiveness. Thereafter a risk matrix was applied to arrive at a final risk rating.

This methodology is described more fully below. It is important to note that the risk assessment, which is done at a high level, differs from the impact assessment which will be used by the specialists during the ESIA phase. The **environmental significance** scale evaluates the importance of a particular impact. This evaluation needs to be undertaken in the relevant context, as an impact can either be ecological or social, or both. The evaluation of the significance of an impact relies heavily on the values of the person making the judgement. For this reason, impacts of especially a social nature need to reflect the values of the affected society. A four-point impact significance scale was applied (**Error! Reference source not found.**).

Table 6.1: Environmental significance rating scale.

Significance		Description
Very High (+)	Very High (-)	These impacts would constitute a major and usually permanent change to the (natural and/or social) environment, and usually result in severe/very severe effects, or beneficial/very beneficial effects.
High (+)	High (-)	These impacts will usually result in long term effects on the social and/or natural environment. Impacts rated as high will need to be considered by the project decision makers as constituting an important and usually long-term change to the (natural and/or social) environment. These would have to be viewed in a serious light.
Moderate (+)	Moderate (-)	These impacts will usually result in medium to long term effects on the social and/or natural environment. Impacts rated as moderate will need to be considered by the project decision makers as constituting a fairly important and usually medium-term change to the (natural and/or social) environment. These impacts are real but not substantial.
Low (+)	Low (-)	These impacts will usually result in medium to short term effects on the social and/or natural environment. Impacts rated as low are generally fairly unimportant and usually constitute a short-term change to the (natural and/or social) environment. These impacts are not substantial and are likely to have little real effect.

The **degree of difficulty of mitigating** the various impacts ranges from very difficult to easily achievable. The four categories used are listed and explained in **Error! Reference source not found.** below. The practical feasibility of the measures, financial feasibility of the

measures, and their potential effectiveness was taken into consideration in deciding on the appropriate degree of difficulty.

Table 6.2:Degree of mitigation difficulty rating scale.

Difficulty	Description
Very difficult	The impact could be mitigated but it would be very difficult to ensure effectiveness and/or to technically/financially achieve
Difficult	The impact could be mitigated but there will be some difficulty in ensuring effectiveness and/or implementation
Achievable	The impact can be effectively mitigated without much difficulty or cost
Easily achievable	The impact can be easily and effectively mitigated

The **risk matrix** determines the overall level of risk associated with an impact by comparing the significance of the impact with its difficulty of mitigation is shown in **Error! Reference source not found.** below.

Table 6.3: Risk matrix derived from the pairing of the significance of the impact and the difficulty of mitigation.

Mitigation Potential	Impact Significance			
	Low	Moderate	High	Very High
Very difficult	Medium Risk	Major Risk	Extreme Risk	Extreme Risk
Difficult	Minor Risk	Medium Risk	Major Risk	Extreme Risk
Achievable	Minor Risk	Minor Risk	Medium Risk	Major Risk
Easily achievable	Minor Risk	Minor Risk	Minor Risk	Medium Risk

Impacts that are of high to very high significance and difficult to very difficult to mitigate are considered to be 'extreme' environmental or social risks to the project. Those impacts that are less significant and easier to mitigate are rated as 'major' to 'medium' to 'minor' i.e. generally impacts of low to moderate significance for which mitigation is achievable to easily achievable. Impacts may potentially be of very high significance, but if the mitigation is easily achievable, they are rated as 'medium' risks, as per **Error! Reference source not found.**. The implications of the risk categories are explained in **Error! Reference source not found.**.

Table 6.4: Risk categories.

Risk	Description
Extreme	Significant mitigatory actions would be required to reduce these risks. In some cases, it may not be possible to reduce these extreme risks meaning they are likely to prevent the option from being used (raised as red flags in this assessment).
Major	These risks are of a serious nature, and without effective mitigation measures would be major hindrances to the project. These would need to be monitored and managed, and in combination Major risks may necessitate the use of a different option to achieve the projects objectives.
Medium	These risks are of a less serious nature but still important, and need to be reduced to As Low As Reasonably Possible (ALARP) for the benefit of the environment or social network affected. In isolation these risks are generally insufficient to prevent the project from proceeding.

Minor	These risks are generally acceptable to the project and environment, and mitigation is desirable but not essential. Best industry practice, however, should be followed and the risks mitigated to prevent a cumulative effect of such impacts.

6.2 Risk Assessment

Refer to Table 6.5 below for the results of the assessment of biological and social risks associated with the Nataka Heavy Minerals Project, which are discussed in accordance with the requirements of the IFC's Performance Standards 2 to 8, (excluding 7) below. The execution of an ESHIA for the Nataka project that is aligned to the IFC Performance Standards will ensure compliance with PS 1, as the scope of work includes meeting Mozambican requirements for public consultation as well as compliance with IFC stakeholder engagement requirements. This helps to achieve the guiding principle of free prior and informed consent. An Environmental and Social Management Programme (ESMP), including a monitoring programme, will be compiled as part of the ESHIA, as a necessary condition for compliance with PS 1. This ESMP will link into Kenmare's existing management system and plans. A sufficiently detailed project description will be presented as part of the next stage of this ESHIA when greater information on the project is available.

Table 6.5: Summary of bio-physical and socio-economic risks in the project area.

Issue	Significance Rating	Comment	Mitigation Potential	Mitigation	Risk
PS 2 – Labour and Working Conditions					
National and Regional Benefits	**Moderate (+)**	Both indirect and direct economic opportunities will be created as a result of the Nataka Heavy Minerals Project. The improved access to the area will indirectly increase the amount of cash inflow to the affected villages and smaller settlements within the project area and may further create opportunities for the sale of goods and services to the mine and mine employees. Services will be upgraded and the road infrastructure around the proposed Nataka mining area will be expanded, potentially improving access and basic service provision for residents in the project area. The project will result in direct economic spin-offs at both provincial and national levels and any income generated from the mining operation will significantly increase the tax base of Mozambique. The mitigation measures to enhance these benefits are considered to be easily achievable at the national and local level.	**Easily Achievable**	• Where feasible, Mozambican nationals must be given preference especially when unskilled and semi-skilled labour is required.	**Minor**
Creation of Employment	**High (+)**	The construction and operation of the mine in the project area will increase employment opportunities at the local level. Although this will mostly be temporary, the proposed mining operation has demonstrated that the skills base in the area increases due to social responsibility spend and training initiatives implemented for the benefit of project area residents. However, due to the general lack of skills in the project area, it is unlikely that many residents and project affected people will be the beneficiaries of permanent employment, with available opportunities generally	**Easily Achievable**	• Where feasible, Mozambican nationals must be given preference especially when unskilled and semi-skilled labour is required. • Implement appropriate training initiatives to improve and increase skills set in the project area.	**Minor**

Issue	Significance Rating	Comment	Mitigation Potential	Mitigation	Risk
		limited to construction phase activities. Despite these draw backs, as a result of current operations mitigation has been demonstrated to be achievable, and this is likely to have a high positive significance at the local level. It is therefore considered to be a major opportunity associated with the project, and conversely a minor risk.			
Working Conditions	**Low (-)**	The workforce is a valuable asset, and therefore a sound worker-management relationship is a key ingredient to the sustainability and success of the project. Failure to establish and foster a sound worker-management relationship can undermine worker commitment and retention and can jeopardize the project. Conversely, through a constructive worker-management relationship, and by treating the workers fairly, and providing them with safe and healthy working conditions, Kenmare have created and will to create tangible benefits.	**Achievable**	• Continue to implement Kenmare's Human Resources (HR) policies in accordance with, and guided by, the requirements of IFC PS2.	**Minor**
Occupational Health and Safety	**Moderate (-)**	There are areas of high risk to personal safety, due to equipment within the plant, dust, significant vehicle movements and other hazards generally associated with an industrial plant.	**Difficult**	• Implement the existing Occupational Health and Safety management plan for workers, and modify if required for the Nataka site.	**Medium**
Social development	**High (+)**	The Kenmare Moma Associação de Desenvolvimento (KMAD) is an independent not-for-profit development organization which supports and contributes to the development of the community close to the mine, assists community members to improve their livelihoods and wellbeing, and in so doing maximises especially the social the benefits from the mine.	**Easily Achievable**	• None identified.	**Minor**

Issue	Significance Rating	Comment	Mitigation Potential	Mitigation	Risk
In-migration	**Moderate (-)**	The project could continue to result in an in-migration of job seekers into the area, which has been shown to occur based on social monitoring results (Nomad Consulting, 2022). This could result in continued pressure on local social services such as schools and clinics. Existing procedures in place have not prevented in-migration, and hence this impact will probably be of moderate significance. The fact that migration, while negatively impacting on service provision, has not otherwise been regarded as a central negative feature for local communities, prevents it being regarded as of high significance. These issues will be dealt with in the socio economic impact assessment, but currently procedures are in place that seem to be effective, but they are to implement.	**Very Difficult**	• Continue to invest in social infrastructure such as schools and other initiatives to reduce pressure on local social services and clinics infrastructure.	**Major**
PS 3 - Pollution Prevention and Abatement					
General and Hazardous Waste	**Moderate (-)**	The mining operations generate general wastes (food, glass, paper, wood, metal, oils and lubricants) which must be disposed of properly in designated waste sites. Additionally, mining activities may cause the spillages of hazardous materials, which will be limited if best practices are enforced. Sewage will need to be treated and disposed of correctly to avoid impacts on ground and surface water resources.	**Achievable**	• Implement the existing Solid and Hazardous Waste Management Plan, and modify for the Nataka site if required.	**Minor**
Surface water and stormwater contamination	**Moderate (-)**	Surface and stormwater can become contaminated through contact with pollutants associated with mining activities such as oils and grease from workshops, hydrocarbons from leaking trucks and pumps, and runoff from refuelling areas for example. However,	**Easily Achievable**	• Surface water must be protected from coming into contact with any pollutants.	**Minor**

Issue	Significance Rating	Comment	Mitigation Potential	Mitigation	Risk
		since most of these activities will take place at the existing operational area the impact is regarded as moderate.		• Stormwater runoff that passes through potentially contaminated areas must be captured and treated appropriately prior to release. • Erosion and sedimentation must be avoided.	
Water Use	**High (-)**	The mining process requires a significant amount of water	**Easily Achievable**	• Establish a water balance. • Ensure water use in aligned with IFC sector specific EHS guidelines for mining. • Develop a Sustainable Water Supply Management Plan. • Careful planning and Consultation with community members.	**Minor**
Groundwater Quantity	**Moderate (-)**	Mining activities will affect local groundwater flow due to the groundwater abstraction activities. These could lower the water table, and make it more difficult for local communities to access drinking water from groundwater wells	**Very Difficult**	• A detailed geohydrological study must be undertaken. • Careful monitoring of groundwater levels to ensure that over-abstraction does not occur.	**Major**
Groundwater Quality	**Moderate (-)**	Mining activities may affect local groundwater quality due to contaminated effluent and contamination through contact with wastes. However, contamination of groundwater is considered unlikely due to the nature of the material being dealt with.	**Achievable**	• Implement appropriate management of waste streams.	**Minor**
Noise	**Moderate (-)**	The mining operation will cause an increase in ambient noise levels in the surrounding areas. The residents living adjacent to the project area will be most affected	**Achievable**	• Implement standard industry practice to reduce noise levels, and apply current mitigation measures.	**Minor**

Issue	Significance Rating	Comment	Mitigation Potential	Mitigation	Risk
		by noise, both during the construction and operation phases.			
Air Quality	**Moderate (-)**	Dust generation could potentially impact on community and worker health due to elevated concentrations of dust, especially along both roads and cleared areas.	**Achievable**	• Implement all current mitigation measures, including: ○ Speed restrictions. ○ Wet road surfaces near villages during windy conditions. ○ Revegetation of exposed areas as soon as practically and feasibly possible.	**Minor**
		Increase in gaseous emissions.		• Implement industry best practise methods including the installation of scrubbers. • Maintain all vehicles in good working order.	
Energy Use	**Moderate (-)**	The mining operation requires significant power which could have a moderate impact on national energy supplies.	**Achievable**	• Correctly size motors and pumps used in the ore moving process wherever possible. • Maintain all vehicles in good working order.	**Minor**
Landscape and Visual Quality	**Moderate (-)**	The natural landscape of Nataka will be significantly disrupted through the establishment of a mine. Vegetation will be cleared, large industrial structures will be built and vehicles and earth moving equipment will become familiar in the landscape. Thus, the aesthetics of the project area will change due to the mine and associated infrastructure.	**Achievable**	• Implement good housekeeping to minimize disruption • Ensure that the rehabilitated landscape approximates the original landscape as much as possible. • It may be necessary to place screens around highly impacted communities. • Avoid excessive lighting at night.	**Minor**

Issue	Significance Rating	Comment	Mitigation Potential	Mitigation	Risk
PS 4 – Community Health, Safety and Security					
Access	**High (-)**	The mining operation will limit access to particular areas due to the presence of the dredge pond and associated infrastructure, and this may affect existing access routes that local communities rely on. This could make access to natural resources and access between villages difficult or more time consuming. The Main road connecting villages could be affected by the proposed mining operations.	**Achievable**	• Construction of new access roads / detour routes where required. • Use of warning / traffic signs where necessary	**Medium**
Safety	**High (-)**	The mining operation can pose severe safety risks to individuals who enter the site without authorisation and appropriate safety information, as well as adjacent communities living close to the site. The death of a local resident would be of high significance.	**Achievable**	• This can be mitigated by restricting access to unsafe areas. • Use of warning / traffic signs where necessary.	**Medium**
Traffic Impacts	**High (-)**	Whilst having ,many benefits, the development and upgrading of roads to service the mine, as well as a significant increase in heavy vehicle traffic, will increase risks to residents' health and safety. There will be a significant increase in the amount of vehicle movements in proximity to the mining operation, and hence an increased risk of vehicle accidents.	**Achievable**	• Implement the Kenmare traffic safety policy. The success of this policy is indicated by the lack of any community related fatalities, and the reporting of all incidents. • Third parties providing delivery service must be compelled to comply with this policy. • Implement speed restrictions. • Use of warning / traffic signs.	**Medium**
Community Health and communicable disease	**High (-)**	In-migration and increases in the labour force employed in the area may impact negatively on the health standards of people in villages in the mine expansion area. This, however, needs to be understood within the	**Achievable**	• A Health Impact Assessment must be undertaken.	**Medium**

Issue	Significance Rating	Comment	Mitigation Potential	Mitigation	Risk
		context of a number of issues. Malaria rates are high in the area, and it is unlikely that in-migration will increase these levels. Furthermore, Kenmare have implemented a malaria prevention programme. If this is pursued in the Nataka area then the rate of malaria may fall. Of concern may be an increase in HIV/AIDS and other STD's. Current infection rates for the villages in the areas are not known but in-migration may increase rates of infection.		• Implement and undertake health awareness campaigns in surrounding villages as part of the social initiative.	
PS 5 – Land Acquisition and Involuntary Resettlement					
Resettlement	**High (-)**	Resettlement can include either the physical displacement of people due to the re-location of their homestead, or economic displacement through the loss of economic activities and livelihoods. Any resettlement would be involuntary, and unless implemented correctly, can cause severe long-term hardship, impoverishment and environmental damage unless adequately managed through a resettlement action plan. The Nataka Heavy Minerals Project will result in the physical relocation of a number of people and the loss of agricultural fields.	**Difficult**	• Development and implement a Resettlement Action Plan. • Implement a comprehensive Stakeholder Engagement Plan. • Comply with IFC Performance Standard 5 on involuntary resettlement. • Implement a resettlement action plan to mitigate this impact. • Ensure that lessons learnt from previous resettlement programmes are applied at Nataka.	**Major**
Loss of land and access to resources	**High (-)**	The loss of productive land and resources, as well as the possible loss of homesteads, is likely to be one of the impacts of greatest concern to the affected population. Access to land and the resources that flow from this land is of critical importance to sustaining a livelihood in communities that are extremely vulnerable as a result of poverty and their isolation from income-generating activities. Vulnerable households will be	**Difficult**	• As above • Develop a Livelihoods Restoration Plan.	**Major**

Issue	Significance Rating	Comment	Mitigation Potential	Mitigation	Risk
		more significantly affected, and although planned and assisted relocation and rehabilitation of land might mitigate this to a certain extent it is anticipated that the impact will be of high significance for the following reasons: • Reduced capacity for household survival. • Increased pressure on surrounding land and resources. • Increased morbidity and malnutrition. • Increased pressure on women to sustain the household. • Loss of homesteads, machambas and ancestral ties • Loss of traditional claims to land. • Increased potential for conflict over access to land and resources. • Loss of access to wood resources. • Loss of communal resources, and. • Increased pressure on local fisheries.			
Changes to social systems and structures	**High (-)**	Social systems and structures that have evolved in the Moma area over generations are not static but have responded dynamically to the changing social environment. Any development of the scale of the proposed project will result in significant social change and the influence of the Kenmare project on the various village social systems and structures is likely to be experienced in several ways – both positive and negative.	**Achievable**	• Undertake a comprehensive social impact assessment to identify issues and concerns. • Identify suitable social and environmental interventions and projects to minimize social disruption.	**Medium**

Issue	Significance Rating	Comment	Mitigation Potential	Mitigation	Risk
PS 6 – Biodiversity Conservation and Sustainable Natural Resource Management					
Loss of vegetation and biodiversity	**Moderate (-)**	The proposed Nataka Heavy Minerals Project will result in the direct loss of indigenous vegetation within the mine path and adjacent areas for secondary infrastructure. The loss of indigenous vegetation will in turn result in the loss of biodiversity and Species of Conservation Concern.	**Difficult**	• The rehabilitation of indigenous vegetation or the re-establishment of cassava and other crops on the post mining landscape is achievable. However, mitigation through rehabilitation of the disturbed landscape would be difficult to achieve as it is anticipated that local communities would prefer the area to be utilized for crop production and woodlots in order to sustain livelihoods after mining. • Mitigation measures identified in the vegetation impact assessment must be implemented during the relevant phases of the proposed development.	**Medium**
Habitat fragmentation and loss of fauna	**Moderate (-)**	The loss of indigenous vegetation is associated with habitat loss and fragmentation. The loss and fragmentation of habitats can lead to the loss of viable populations, especially in animals requiring large home ranges. Fragmentation has serious impacts on forest and woodland specialists; however fragmentation on wetlands has minimal impacts as most fauna are seasonal inhabitants. Current land use patterns have already had a significant impact on the existing fauna both due to traditional shifting agriculture which results in habitat fragmentation and hunting.	**Difficult**	• Rehabilitate disturbed areas. • Mitigation measures identified in the faunal impact assessment must be implemented during the relevant phases of the proposed development.	**Medium**
Rehabilitation				•	

Issue	Significance Rating	Comment	Mitigation Potential	Mitigation	Risk
Disturbance to drainage lines and the Larde River	**High (-)**	The Nataka project area includes several tertiary tributaries that flow into one of the main secondary tributary of the Larde River. These linear drainage features mainly slope from south to north and drain the site into the Larde floodplain. Mining operations will result in the loss of a number of these tributaries. Furthermore, mining could result in the erosion, sedimentation or subsequent degradation of the Larde River system and associated riparian vegetation.	**Difficult**	• All erosion control mechanisms should be regularly maintained. • Re-vegetation of disturbed surfaces must occur immediately after mining activities have been completed.	**Major**
Impacts of mining on soil productivity	**High (-)**	The mining process impacts on the physical and chemical properties of the soil because the soil profile is disturbed during mining and fine material (slimes) is lost. Productivity of topsoil can be reduced due to stockpiling initially, although in later years very limited or no stockpiling will take place. Nevertheless, soil disturbance and handling can result in changes to the cation exchange capacity, the water holding capacity and the erodibility of the soils. These changes to soil fertility also impact on crop productivity and agricultural potential of the land	**Difficult**	• Re-blending of slimes and sand materials during rehabilitation needs to be attempted, although previous studies have shown that this is difficult.	**Major**
PS 8 – Cultural Heritage					
Graves	**Moderate (-)**	Graves are an integral part of families and communities. The physical removal or relocation of graves is a sensitive impact that could cause social disorientation and psychological insecurity to communities. Relocation could also increase social tension within the household, disrupting social stability.	**Achievable**	• Any relocation must take place with the full participation of affected families and communities, and all costs related thereto must be covered by the developer.	**Minor**

7 TERMS OF REFERENCE FOR SPECIALIST STUDIES

Although CES has a wealth of biophysical and socio-economic baseline data for the broader Namalope, Pilivilli, Nataka & Congolone areas and will draw on this as far as possible, it is still necessary to complete specialist studies (including field surveys) within the specific study area as part of this process. However, the existing information available for the broader area will be used to contextualise the site and any issues such as Species of Conservation Concern (SCC) that might be identified.

7.1 SPECIALIST STUDIES REQUIRED AS PART OF THE PROJECT

The following specialist studies will be undertaken to supplement and inform the ESIA:

- Vegetation Assessment
- Terrestrial Faunal Assessment
- Soils, Land and Natural Resource Use and Agriculture
- Groundwater Assessment
- Surface Water Assessment (including baseline survey)
- Wetland Assessment
- Socio-economic Impact Assessment including Cultural and Heritage Assessment
- Health Impact Assessment
- Radiation Assessment
- Waste Management Assessment
- Air Quality Assessment (including baseline)
- Noise Assessment (including baseline)
- Rehabilitation Strategy
- Materials handling, Infrastructure and Transport Assessment

The following sections define the tasks that will be undertaken to assess the potential impacts the project would have within the particular field of expertise and lists the specific Terms of Reference (ToR) for each specialist study. It is the responsibility of the specialist to determine the best approach, methodologies, and analysis to ensure that all issues are adequately covered and assessed, including all issues raised by Interested and Affected Parties (I&APs).

7.1.1 Vegetation Assessment

The proposed project will result in the loss of indigenous vegetation during both the construction and operational phase. Vegetation is an important aspect of the landscape and the ecological functioning of the area and provides important habitats for many faunal species particularly birds, insects, and reptiles. The clearance of vegetation associated with the proposed project will therefore have an impact on ecological processes, the availability of faunal habitat, ecosystem services and Species of Conservation Concern, amongst others.

The removal of indigenous vegetation will create 'open' habitats which favours the establishment of undesirable vegetation (alien plant species) in areas that are typically very difficult to eradicate which could pose a threat to surrounding ecosystems. As such, baseline data on the vegetation of the area is needed to assess impacts related to this loss of vegetation, and to facilitate rehabilitation.

The specific terms of reference for the vegetation assessment are as follows:

- To record the plant species that occur within the Nataka deposit area, based on field surveys.
- To identify any species of special concern, namely species with conservation status or which are endemic to the area.
- To comment on the conservation status of specific plant species.
- To compile a broad-scale vegetation or habitat map of the area. This vegetation map should indicate the extent that mining activities would affect each vegetation or habitat type, such as the impacts on wetlands located in the concession area.
- To record as many plant species of ethnobotanical significance as possible, and to integrate this information into the Soils, Land & Natural Resource Use and Agricultural Assessment.
- To assess the level of dependence of the local inhabitants on the vegetation of the immediate and surrounding areas, and the impact that the removal of this vegetation would have on the community. Close liaison with the social scientists will be essential.
- To identify alien invasive species and the levels of infestation, with particular focus on rehabilitation that would reduce the significance of this impact.
- To work in consultation with other specialists to ensure that the linkages between the various systems are understood.
- Assess the environmental significance of these impacts using a methodology compliant with international best practice.
- To provide practical and realistic recommendations to mitigate impacts with a particular focus on rehabilitation that would reduce the significance of vegetation loss.

7.1.2 Faunal Assessment

Vegetation clearance and associated construction activities (including noise and vehicular movement) could result in the mortality or disturbance of faunal species and the subsequent movement of species out of the area. Additionally, the loss of vegetation coincides with the loss of faunal habitat, which could impact on the feeding, breeding and rearing locales of faunal species within the project area during construction. It is therefore important to assess the level of impact on biodiversity, and especially the faunal groups that make use of the habitats that will be lost as a result of mining and vegetation clearance. Although the site has been severely depleted of indigenous faunal species due to hunting and previous loss of habitat, it is necessary to determine the baseline condition of the area to assess the impacts on faunal species arising through the further loss of habitat and food sources.

The specific terms of reference for the faunal assessment are as follows:

- Assess the conservation value of the various plant communities and ecological habitats

in the area, in order to assess the significance of habitat loss on faunal groups as a result of the development.

- Define and map faunal habitats that are sensitive and require conservation. These may need to be defined as No-Go or Restricted Development areas.
- Review the mine path and compare it to the vegetation sensitivity maps. Any conflicts or areas that may be impacted will need to be noted and assessed
- Carry out a rapid survey to assess the diversity of amphibian, reptile, bird and mammal species in the area.
- Identify any rare or endangered faunal species that require consideration in the conservation programme.
- Describe the impacts of current land use, so that the potential impacts from the development on the natural environment can be understood in this context.
- Determine the impacts of the construction and operation of the proposed development on the faunal biodiversity in the area.
- The significance of the potential impacts and benefits must be assessed using the CES methodology. Any predictions will need to include the confidence in the impacts occurring, and the significance of these impacts occurring on the local fauna.
- Provide recommendations and mitigation measures that will reduce negative impacts on the local ecology and optimise conservation benefits.
- Develop a monitoring programme to ensure effective implementation of the recommended mitigation measures.

7.1.3 Soils, Agriculture, Land Use and Natural Resource Use Assessment

The objective of this study is to determine the condition of existing soils and land use patterns, and the impacts the proposed mining project would have on soils and land use patterns both within the concession and the surrounding areas.

The specific terms of reference for the Soils, Agriculture, Land Use and Natural Resource Use Assessment are as follows:

- Provide, at a reconnaissance level, a soils map of the proposed mining area.
- Identify and comment on the different land use patterns within the concession (e.g. productivity levels) and relate these to other areas of Mozambique for comparative purposes.
- Evaluate the land capability/suitability of the area at a reconnaissance level and comment on the productive potential of the area for agriculture and other land uses.
- Engage with the social scientists to ensure that questions related to land use are asked during the social impact assessment, to clarify the complexities associated with subsistence land use.
- Map existing land use and align land use categories with the vegetation map.
- Identify potential food, cash crop and afforestation species that could be used in the rehabilitation process.
- Ensure that the study deals with any other issues related to land use raised during scoping.
- Develop a monitoring programme to ensure effective implementation of the

recommended mitigation measures.

7.1.4 Groundwater and Surface Water Assessment

Activities on site are expected to ultimately include a dredge mining operation with floating concentrator plant, supplementary mining such as dry mining, hydro mining (using a water cannon) and associated mining infrastructure including tailings disposal into a TSF and the mined-out dredge path and pumping and hauling of HMC to the MSP at its current location in Namalope. In terms of water resources, use of groundwater and surface water during mining activities could put pressure on local water supplies, either quantitatively (by reducing yield for local supplies) or qualitatively (by contaminating water sources and reducing fitness for use) or both. Mining will therefore impact on both surface and ground water resources. Kenmare has already initiated a geohydrological study, and thus this study must assess water quality and quantity impacts relating to surface water resources within the demarcated deposit area.

The specific terms of reference for the study are to:

- Ascertain the ecological state and functioning of the drainage network.
- Provide a basic characterisation of the water resources, including seasonal variations, based on existing information including baseline quantities and qualities
- Identify any environmental impacts on water resources that may result from the mining process.
- Identify significant impacts that may result either directly or indirectly from the use of water during mining.
- Comment on any risks of polluting surface and groundwater resources at the project area.
- Address the impact that dredge water may have on potable water supplies.
- Identify any other significant impacts that may result indirectly through the abstraction of water in the concession area.
- Determine whether there will be any cumulative impact on water resources.
- Determine the social implications of water abstraction.
- Develop a suitable surface hydrological model to simulate the surface hydrology of each sub-catchment to inform stormwater flows and wetness within the wetlands before mining, during operation and potentially for the post mining landscape. Obtain data from the geohydrologist on baseflow (groundwater return-flow) for input into the model.
- Work in consultation with other specialists to ensure that the linkages between the various systems are understood.
- Assess the significance of the impacts, and provide practical and realistic recommendations (from a cost perspective) to mitigate impacts
- Develop a monitoring programme to ensure effective implementation of the recommended mitigation measures.

7.1.5 Wetland Assessment

A preliminary wetland red flag study (WCS, 2021) was undertaken for the Nataka deposit, which highlighted several potential risks and impacts to wetlands that could materialise should

mining proceed. Of critical importance is to develop a detailed understanding of wetland hydrology, the main driver of wetland formation and maintenance in the landscape, as well as likely changes to wetland hydrology brought about by mining. This understanding of the wetland hydrology will allow for interpretation and prediction of likely impacts to wetland habitat and wetland biota, as well as assist in better predicting the likely implications for domestic and agricultural water supply and loss of agricultural resources associated with wetlands.

The specific terms of reference for the wetland assessment are as follows:

- A detailed pre-mining water quality baseline must be established for all affected wetland systems. This is critical to allow for evaluation of any changes in water quality during and after mining
- The baseline wetland assessment included as part of this study should be expanded to include field verification of all wetland systems likely to be affected by the proposed mining activities. Incorporation of findings from other specialist studies (specifically hydrological - including surface and groundwater modelling - assessments and ecological assessments) should be incorporated into the wetland assessment and a detailed impact assessment undertaken.
- Evaluate whether the wetlands are sustained by surface water or groundwater baseflow or by a combination of both sources. This will need to be a collaborative effort with the geohydrologist.
- Prepare a map demarcating the relevant local drainage area of the respective wetland/s, i.e. the wetland, its respective catchment and other wetland areas within a 500m radius of the study area to demonstrate, from a holistic point of view the connectivity between the site and the surrounding regions, i.e. the zone of influence.
- Prepare maps depicting demarcated wetland areas delineated to a scale of 1:10 000, together with a classification of delineated wetland areas.
- Determine the ecological state of wetland and riparian areas, and estimate their biodiversity, conservation and ecosystem importance. This determination must include avifaunal, herpetological or invertebrate studies.
- Recommend buffer zones and No-go areas around any delineated wetland areas based on the relevant legislation, best practice or professional judgement for those systems that are found to have ecological value and should be retained. This is particularly important where any wetlands or waterbodies provide ecological services, such as human food resources.
- Provide practical mitigation measures to minimise environmental and social impacts associated with disturbance of the wetland.
- Recommend specific actions that could enhance the wetland functioning in the areas, allowing the potential for a positive contribution by the project, e.g. useful of artificial wetlands in stormwater control
- Supply geo-referenced GIS shape files of the wetland / riverine areas.

7.1.6 Socio-economic Assessment

The project will result in national, regional and local economic benefits. Although this project involves the relocation of an existing operation and sustaining existing development, this project is envisaged to provide support for infrastructural development and, at a local level, will provide job opportunities and benefits arising from the multiplier effects associated with these.

The primary objectives of this study will be:

- To provide a detailed description of the socio-economic environment in and around the project area.
- To provide empirical socio-economic data to be used as a baseline for future monitoring.
- To analyse the potential impacts of the proposed project.
- To provide guidelines for limiting or mitigating negative impacts and optimising benefits of the proposed project, taking into account the experience gained during the Namalope project to date.

The specific terms of reference for the socio-economic assessment are as follows:

- Describe the local socio-economic environment, with particular reference to the communities that will be directly affected by the project.
- Undertake focus group meetings with vulnerable groups to ensure that their concerns and needs are understood.
- Assess the significance of potential environmental and social impacts on the local populace and the District.
- Identify project-related impacts and provide recommendations for mitigating negative impacts and optimising positive impacts, taking into account experience gained from the Namalope project.
- Assess the social significance of these impacts and provide mitigation measures.
- Describe the direct and indirect economic benefits of the project at local, regional and national levels. As an option, consider using economic models that could quantify direct and indirect economic benefits, as well as backward and forward linkages, multiplier effects and real benefits that might arise from employment opportunities.
- Investigate possible effects on livelihoods, income levels, education levels, food security and other factors relevant to the affected communities' ability to participate in the potential economic benefits the project may offer.
- If necessary, undertake the required surveys to quantify the number of households (and people) that may need to be resettled as a result of the project.
- Consultatn with stakeholders should be done in such a way as to contribute to the formulation of a Resettlement Action Plan (RAP) or Livelihood Restoration Plan.
- Evaluate how the project could contribute to community upliftment programmes.
- Develop a monitoring programme to ensure effective implementation of the recommended mitigation measures.
- Social impact study to specifically include impacts due to loss/reduction of domestic water supply, loss of water supply for crop watering, loss of wetland habitat and organic soils for cultivation.

7.1.7 Cultural and Heritage Assessment

The project may result in the loss of cultural and heritage sites, and in order to comply with IFC Performance Standard 8 an assessment is required to:

- Determine the likelihood of encountering archaeological and cultural remains of significance in the project area.
- Identify and map (where applicable) the location of any significant archaeological remains or cultural sites (in consultation with the social specialists).
- Assess the sensitivity and significance of archaeological remains and cultural sites in the project area.
- Together with the social specialist, gain an understanding of cultural beliefs and practices, particularly those relating to sites of cultural significance that could be affected.
- Identify mitigation measures to protect and maintain any valuable archaeological sites and remains, and any culturally important areas that may exist within the project area.
- Identify any sites of historical or cultural importance, and establishment of no-go areas.
- Gain an understanding of cultural beliefs and practices, particularly those relating to sites of cultural significance that could be affected.
- Develop a monitoring programme to ensure effective implementation of the recommended mitigation measures.

7.1.8 Health Impact Assessment

The first phase in developing an evidence-based community health action plan for the Nataka project involves a scoping survey that will be undertaken and will inform the baseline data collection and also the risk and impact assessment process. The scoping HIA report will include:

- Profiling of the potentially affected communities and impact areas of concern. This will be completed in conjunction with the social assessments.
- Analysing environmental health areas that include health determinants and health outcomes. This will incorporate both health impacts as well as health needs. This is the preferred IFC methodology, which has been adopted to ensure a systematic method is used.
- Review of past activities and reports undertaken during the Namalope project.
- Identification of relevant data gaps that may exist in the baseline data. This phase will allow the clear terms of reference to be determined for the comprehensive health impact assessment and future development of the community health management plan.
- Identification of key stakeholders and development of a key stakeholder's forum to support the development of the management plan in the next phase.

An integrated approach will be adopted, in which health data collection (in the form of household surveys and focus group discussions) will be incorporated as part of the social impact assessments. Quantitative and qualitative data will be used to undertake an impact

assessment. The scoping-level survey must not involve any physical medical examinations or tissue / blood sampling.

7.1.9 Radiation Impact Assessment

The purpose of the study is to examine the radiological aspects of the project, since the ore body is known to contain minerals enhanced in uranium and thorium, which will be concentrated and extracted during mining and processing. In addition, a variety of waste streams containing uranium and thorium will be produced. The presence of uranium and thorium in the products, wastes and effluents from the project may result in the exposure of workers and the public to ionising radiation. These issues need to be identified and addressed. Additional health and safety processes may be required if cumulative impacts are identified.

The specific terms and reference for the Radiation Impact Assessment includes the following:

- Provide an overview of background radiation sources and exposure.
- Provide an overview of naturally occurring radioactive materials in the mining and processing of heavy minerals.
- Provide an overview of the international system of dose limitation recommended by the International Commission on Radiological Protection (ICRP), the International Atomic Energy Agency (IAEA), and the Agência nacional de Energia atómica (ANEA) as well.
- Provide a brief review of the safety standards and guideline documents on the mining of Normally Occurring Radioactive Material (NORM) materials produced by the IAEA, and the practices implemented by Kenmare to demonstrate compliance.
- Provide a summary of the currently available information on the radiological characteristics of the Nataka ore bodies and compare this with the Namalope ore body.
- Summarise the background gamma radiation levels at the ore body and compare these to world norms and the Namalope ore body. Provide comment on any aspects that require further investigation and data.
- Complete a full spectrum radiation analysis of environmental samples (limited to 10 samples)
- Make recommendations regarding the components and methodology of a comprehensive baseline radiation survey at the ore body.
- Identify the potential radiological exposure pathways to both workers and the public which may result from the proposed mining and processing activities.
- Provide an overview of the components of the radiological protection programmes that will be required during the mining and minerals processing operations.
- Provide generic recommendations regarding the engineered controls that can be used in the plant design to keep doses as low as reasonably achievable, and note any changes compared to current practice which may be required as a result of any differences between the radiological characteristics of the Namalope and Pilivili deposits.
- Provide generic recommendations regarding the administrative controls that can be used during operations to keep doses as low as reasonably achievable.
- Identify and describe the anticipated negative and positive radiological impacts during the construction, operation, decommissioning and mine closure phases.

- Describe how the negative issues and impacts should be managed and incorporated into engineering and administrative specifications for the mine.
- Develop a monitoring programme to ensure effective implementation of the recommended mitigation measures.

7.1.10 Waste Management Study

This study will focus on the environmental impacts that may arise from the handling, storage and disposal of solid and liquid wastes from the mining and mineral processing activities and ancillary facilities. It will need to identify the various waste streams, and through a review of the existing environmental management structure used for the Namalope project, make recommendations on how to handle the additional waste streams. Only waste streams generated within the Nataka deposit, and ancillary infrastructure to the MSP at Namalope need to be considered.

- Compile an inventory (identify, describe and, where possible, quantify) of the various waste streams to be generated by sources. This will not require the analysis of solid waste samples.
- Briefly describe the processes giving rise to the waste streams and the volumes and tonnages of waste streams.
- Identify and describe the possible impacts of any solid and liquid wastes on the quality of surface and groundwater.
- Assess the risks to the health and safety of workers at the dredging and wet concentrator plants and related works (but excluding the existing mineral separation plant) and residents within the project's area of influence.
- Provide recommendations on the most feasible options for the disposal of solid and liquid wastes.
- Describe the levels of hazardous waste on site, paying particular attention to any material that might be regarded as radioactive, and make recommendations for the disposal and/or recycling of these materials.
- Relate levels of any potentially toxic waste to recognised international standards and ensure that any waste management strategy is in line with these standards.
- Develop a monitoring programme to ensure effective implementation of the recommended mitigation measures.

7.1.11 Air Quality Assessment (including baseline)

The terms of reference for the baseline assessment include the following:

- Assess the current levels of air pollution (including dust) and characterise current air quality on sensitive receptors within the two project sites.
- Identify other risk sources of air pollution from the project, especially dust from mining activities and vehicle entrainment.
- Identification of air quality-sensitive receptors, including any nearby residential dwellings and proposed receptors.
- Collection of local weather conditions either from local weather station sources or by

modelled MM5 data;

- Preparation of three years of raw meteorological data. The required meteorological data includes hourly average wind speed, wind direction and temperature data.
- Simulation of wind field, mixing depth and atmospheric stability.
- The legislative and regulatory context, including emission limits and ambient air quality standards, and with specific reference to Mozambique.
- Assessment of baseline air pollutant measurements.

The terms and reference for the air quality assessment are to:

- Quantify all particulate emissions using local meteorological data, and the proposed throughput for the operational phase of the project.
- Predict, using suitable dispersion modelling or other appropriate methodologies, the air concentrations and emissions fallout and dust fallout due to each of the identified sources.
- Quantify all emissions arising from the plant and transport of materials and products.
- Assess what the impact of the project will be on ambient air quality. This will mean determining increased levels of pollution in the area and ranking them in terms of severity, frequency, locality and impact on the receiving environment.
- Assess the environmental significance of these impacts, including climate change.
- Ensure compliance with the IFC General EHS Guidelines (April 2007) and IFC EHS Guidelines for Mining (December 2007).
- Provide recommendations on ways in which Greenhouse Gas (GHG) emissions can be reduced or offset.
- Suggest ways to avoid, mitigate, or ameliorate the impacts by discussing modifications or improvements to process design with production engineers.
- Develop a monitoring programme to ensure effective implementation of the recommended mitigation measures

7.1.12 Materials handling, infrastructure, and Transport Assessment

The purpose of this study is to assess the potential impacts of the Nataka project on existing local road and related infrastructure, and on public safety, of traffic generated by the proposed relocation and potential expansion of the mining operation, both during the construction and operational phases.

Kenmare has instituted and implemented a road traffic safety programme in respect of the existing mining operation on the Namalope Reserve (which includes enforced speed limits on roads inside the project area and on external public roads, rules concerning public right of way, and extensive road safety signage), and has also upgraded and maintained the public roads used for mining and related activities.

This study will thus comprise an evaluation of the existing programme in the context of any public roads that will be used for the mining expansion and proposing necessary refinements and amendments to account for circumstances that have not arisen in the existing operation.

Special attention will be paid to issues arising from the expected increase in regular traffic between the existing operations at Namalope and the mining operations at Nataka.

7.1.13 Noise Impact Assessment

The purpose of this study is to assess the potential impacts of the Nataka project on sensitive receptors and provide a recommended buffer area. A baseline noise assessment is not expected to be required at this stage and will occur prior to construction phase.

7.1.14 Rehabilitation Strategy

The formulation of a rehabilitation strategy and plan for the Nataka project site is required. This rehabilitation strategy needs to:

- Consider post mining consolidation settlement in consultation with other specialists addressing the tailings deposition.
- Identify a strategy for rehabilitation toward sustainable land-use after mining by consulting with local communities on their objectives for the rehabilitated land as well as balancing this with development of biodiversity and carbon sequestration requirements.
- Take into account actual experience at Namalope to date by undertaking a survey of the existing rehabilitation programme at Namalope, reviewing this programme and providing specific recommendations for rehabilitating disturbed areas at Nataka.
- Develop a monitoring programme to ensure effective implementation of the recommended mitigation measures.

8 CONCLUSIONS AND WAY FORWARD

8.1 CONCLUSIONS

A total of twenty-seven (27) potential risks were identified for the proposed project. Of these twenty-seven potential risks, ten (10) were classified as having a significance of high negative, thirteen (13) were classified as being of moderate negative and one (1) was classified as low negative prior to mitigation. Additionally, two (2) were classified as high positive and one (1) as moderate positive (Table 8.1). In terms of risks, with the implementation of sound mitigation measures, the majority of the potential risks identified can be reduced to minor or medium. However, seven (6) risks were classified as major, and it is these risks that require careful consideration during the ESIA phase. Three of these risks are biophysical in nature, and relate to impacts on groundwater quantity and quality, disturbance to drainage lines and the Larde River, and impacts of mining on soil productivity. The remaining four are social risks relating to in-migration, impacts related to disrupting community access routes, risks associated with involuntary resettlement, and loss of land and access to resources,

Table 8.1: Summary of the potential risks associated with the project.

Issue	Significance Rating	Mitigation Potential	Anticipated Risk
PS 2 – Labour and Working Conditions			
National and Regional Benefits	**Moderate (+)**	Easily Achievable	**Minor**
Creation of Employment	**High (+)**	Easily Achievable	**Minor**
Working Conditions	**Low (-)**	Achievable	**Minor**
Occupational Health and Safety	**Moderate (-)**	Difficult	**Medium**
Social Development	**High (+)**	Easily Achievable	**Minor**
In-migration	**Moderate (-)**	Very Difficult	**Major**
PS 3 - Pollution Prevention and Abatement			
General and Hazardous Waste	**Moderate (-)**	Achievable	**Minor**
Surface water and stormwater contamination	**Moderate (-)**	Easily Achievable	**Minor**
Water Use	**High (-)**	Easily Achievable	**Minor**
Groundwater Quantity	**Moderate (-)**	Very Difficult	**Major**
Groundwater Quality	**Moderate (-)**	Achievable	**Minor**
Noise	**Moderate (-)**	Achievable	**Minor**
Air Quality	**Moderate (-)**	Achievable	**Minor**
Energy Use	**Moderate (-)**	Achievable	**Minor**
Landscape and Visual Quality	**Moderate (-)**	Achievable	**Minor**
PS 4 – Community Health, Safety and Security			
Access	**High (-)**	**Difficult**	**Medium**

Issue	Significance Rating	Mitigation Potential	Anticipated Risk
Safety	High (-)	Achievable	Medium
Traffic Impacts	High (-)	Achievable	Medium
Community Health and communicable disease	High (-)	Achievable	Medium
PS 5 – Land Acquisition and Involuntary Resettlement			
Resettlement	High (-)	Difficult	Major
Loss of land and access to resources	High (-)	Difficult	Major
Changes to social systems and structures	High (-)	Achievable	Medium
PS 6 – Biodiversity Conservation and Sustainable Natural Resource Management			
Loss of vegetation and biodiversity	Moderate (-)	Difficult	Medium
Habitat fragmentation and loss of fauna	Moderate (-)	Difficult	Medium
Disturbance to drainage lines and the Larde River	High (-)	Difficult	Major
Impacts of mining on soil productivity	High (-)	Difficult	Major
PS 8 – Cultural Heritage			
Graves	Moderate (-)	Achievable	Minor

8.2 Way Forward

This EPDA and ToR has described the potential risks associated with the project and has provided detailed ToR for specialist studies that will be required during the ESIA phase. These studies are currently underway.

The report to be prepared for the ESIA will be divided into five volumes to cover the information as stipulated by Mozambican requirements. The volumes will be as follows:

- **Volume 1:** EPDA/Scoping Report (This Volume)
- **Volume 2:** Specialist Studies
- **Volume 3:** Environmental and Social Impact Assessment Report (ESIA)
  This volume is likely to include the following (but please note that the Table of Contents presented below is indicative and may change):

  1 INTRODUCTION
  2 ESIA PROCESS
  3 LEGAL FRAMEWORK
  4 PROJECT DESCRIPTION
  5 DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT
  6 DESCRIPTION OF THE SOCIO-ECONOMIC ENVIRONMENT
  7 KEY PHYSICAL IMPACTS
  8 KEY BIOLOGICAL IMPACTS

9 KEY SOCIO-ECONOMIC AND HEALTH IMPACTS
10 CUMULATIVE IMPACTS
11 PROJECT ALTERNATIVES
12 CONCEPTUAL DECOMMISSIONING AND CLOSURE PLAN
13 EFFECTS OF THE PROJECT ON GLOBAL CLIMATE CHANGE
14 RECOMMENDATIONS AND CONCLUSIONS

- **Volume 4:** Public Participation Report
  Public consultation concludes with the preparation of a public consultation report, which will be submitted as part of the ESIA.
- **Volume 5:** Social and Environmental Management Programmes
  All recommendations cited in the ESIA report (resulting from the ESIA process) will be described in the Environmental Management Programme (EMP), which will provide details on the Environmental and Social Management Plans (ESMPs) that will be required to be implemented during the construction and operation phases of the project.
- Non-technical Summary document: This document will provide a short summary of the ESIA.

9 REFERENCES

Biofund. 2022. Primeiras e Segundas Environmental Protection Area. Available at: https://www.biofund.org.mz/en/projects/apoio-as-ilhas-primeiras-e-segundas/ [Accessed May 2022].

BirdLife International. 2018. Circus macrourus. The IUCN Red List of Threatened Species 2018: e.T22695396A132304131. https://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22695396A132304131.en. Downloaded on 03 September 2021

BirdLife International (2021) Important Bird Areas factsheet: Primeiras and Segundas Environmental Protection Area (APAIPS). Downloaded from http://www.birdlife.org on 03/09/2021.

Club of Mozambique, 2019. Watch: Almost 28 million people in Mozambique in 2017, says census – AIM report. Online:https://clubofmozambique.com/news/watch-almost-28-million-people-in-mozambique-in-2017-says-census-aim-report/City Population, 2020. Online. https://www.citypopulation.de/en/mozambique/admin/nampula/0319__nacala/.

Emslie, R. 2020. Diceros bicornis. The IUCN Red List of Threatened Species 2020: e.T6557A152728945. https://dx.doi.org/10.2305/IUCN.UK.2020-1.RLTS.T6557A152728945.en. Downloaded on 05 August 2020.

Farooq, H. O. M., & Conradie, W. (2015). Second record of a Scolecomorphus kirkii Boulenger, 1883 (Gymnophiona: Scolecomorphidae) for Mozambique. Herpetology Notes, 8, 59-62.

Faulkes, C. G., Mgode, G. F., Archer, E. K., and Bennett, N. C. 2017. Relic populations of Fukomys mole-rats in Tanzania: description of two new species F. livingstoni sp. nov. and F. hanangensis sp. PeerJ 5: e3214; doi: 10.7717/peerj.3214.

Instituto Nacional De Estatistica (INE), 2020. Online. http://www.ine.gov.mz/

Jacques, H., Reed-Smith, J. & Somers, M.J. 2015. Aonyx capensis. The IUCN Red List of Threatened Species 2015: e.T1793A21938767. https://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T1793A21938767.en. Downloaded on 01 September 2021.

Jacobs, D. 2019. Scotoecus albofuscus. The IUCN Red List of Threatened Species 2019: e.T20054A22025597. https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T20054A22025597.en. Downloaded on 01 September 2021.

Kenmare Nataka Pre-feasibility study, March 2011. Moma Phase 3 Expansion Technical scoping report. Confidential document, 386 pp.

MITADER (2015). National Report on Implementation of the Convention on Biological Diversity in Mozambique. Maputo, Mozambique.

Nomad Consulting (2022) Moma Titanium Minerals Mine, Mozambique, Social and Resettlement Monitoring Report, 2021, Nomad Consulting, South Africa.

Ohler, A., & Frétey, T. (2014). Going Back to Rovuma: The Frog Fauna of a Coastal Dry Forest, and a Checklist of the Amphibians of Mozambique. Journal of East African Natural History, 103(2), 73-124.

Ollis, D.J., Snaddon, C.D., Job, N.M. and Mbona, N. 2013. Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems. SANBI Biodiversity Series 22. South African National Biodiversity Institute, Pretoria.

Pietersen, D., Jansen, R. & Connelly, E. 2019. Smutsia temminckii. The IUCN Red List of Threatened Species 2019: e.T12765A123585768. https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T12765A123585768.en. Downloaded on 01 September 2021.

Schneider, M., Buramuge, V., Aliasse, L., & Serfontein, F. (2005). Checklist and Centres of Vertebrate Diversity in Mozambique. Forestry Department (DEF), Eduardo Mondlane University, Maputo, Mozambique.

Synergia. (2016). Nacala Corridor Resettlement Status Report. Av. Ipiranga, 104 -13º andar –República, CEP -01046-010 –São Paulo –SP Brasil.

Statista. 2020. Mozambique: Distribution of gross domestic product (GDP) across economic sectors from 2009 to 2019. https://www.statista.com/statistics/507266/mozambique-gdp-distribution-across-economic-sectors/ Accessed: 1 September 2020.

Stein, A.B., Athreya, V., Gerngross, P., Balme, G., Henschel, P., Karanth, U., Miquelle, D., Rostro-Garcia, S., Kamler, J.F., Laguardia, A., Khorozyan, I. & Ghoddousi, A. 2020. Panthera pardus (amended version of 2019 assessment). The IUCN Red List of Threatened Species 2020: e.T15954A163991139. https://dx.doi.org/10.2305/IUCN.UK.2020-1.RLTS.T15954A163991139.en. Downloaded on 01 September 2021.

Team Africa Geographic, 2013, Scientists discover new giant mole-rat in Africa. Accessed from https://africageographic.com/stories/scientists-discover-new-giant-mole-rat-in-africa/ accessed on 08.09.2021.

Wetland Consulting Services (Pty) Ltd. 2021. Wetland Risk Assessment, Kenmare Nataka Project.

APPENDIX 1 – CATEGORISATION LETTER

REPÚBLICA DE MOÇAMBIQUE

CONSELHO DOS SERVIÇOS PROVINCIAIS DE REPRESENTAÇÃO DO ESTADO DE NAMPULA

SERVIÇO PROVINCIAL DO AMBIENTE

À:

Kenmare Moma Mining (Mauritius) Limited e Kenmare Moma Processing

Maputo

N/Refª Nº 612 /SPA/RLA/220

Nampula, aos 07/06/2022

Assunto: **Envio de Parecer Técnico de Pré-avaliação Ambiental do Projecto de Extracção de minerais pesados do depósito de Nataka, localizado na zona de Nataka, Distrito de Larde, Província de Nampula**

Para os devidos efeitos e demais providências, junto em anexo se envia a V.Excia o parecer técnico resultante da pré-avaliação do impacto ambiental da actividade supra citada, **categorizada para o nível A.**

Assim, o proponente deverá submeter ao MTA o EPDA acompanhado dos respectivos Termos de Referencia (TdR) a cores em papel A4 e um suporte informático selado e 4 exemplares para o SPA de Nampula, feitos com base na Directiva Geral para a elaboração de Estudo de Impacto Ambiental aprovada pelo Diploma Ministerial nº129/2006 de 19 de Julho, para análise e tomada de decisão.

Nada mais havendo do momento, aproveitamos a ocasião para endereçar as nossas cordiais saudações.

O Director do Serviço Provincial,

José Júlio Luís

/Técnico Superior N1/

Visto

08/06/2021

A Chefe do Departamento

Delfina S. Falume

/Técnica Superior N1/

Parecer Técnico de Pré-avaliação Ambiental do Projecto de Extracção de minerais Pesados do Depósito de Nataka, localizado na zona de Nataka, Distrito de Larde, Província de Nampula.

Introdução

A Kenmare Moma Mining (Mauritius) Limited e Kenmare Moma Processing, na qualidade de Proponente deste projecto, vem responder ao imperativo de prover o país na actividade de extraccao de minerais pesados actualmnte que decorre na zona de Namalope, distrito de Larde, Província de Nampula. Para esse feito, a Kenmare pretende realocar as operacoes de mineracao existente para uma nova area de mineracao concretamente no depósito de Nataka, situado aproximadamente a 8km a situeste de Namalope, dentro da concessao existente da Kenmare.

Para alcancar este efeito, a empresa iniciou um processo de licenciamento ambiental do projecto para a sua operacionalizacao, com a submissão da respectiva instrução do processo.

Para flexibilização do processo, o sector de licenciamento ambiental deslocou ao local onde decorrerá o passo seguinte da actividade de extracção de minerais pesados, uma equipa de técnicos para uma pré-avaliação ambiental com vista a aferir os prováveis impactos ambientais a serem criados pelo projecto.

Contextualização

A visita ao local realizou-se na fase preliminar, e enquadra-se no âmbito da pré-avaliação ambiental prevista no artigo 8 do Decreto 54/2015 de 31 de Dezembro. Esta serviu para, entre outros assuntos, avaliar a situação sócio ambiental de referência do local de implantação do projecto.

Enquadramento Legal da actividade

A Línea f) do número 1 do artigo 204 da Constituição da República, "promover e regulamentar a actividade económica e dos sectores sociais."

Nome do Proponente

Os proponentes da actividade é Kenmare Moma Mining (Mauritius) Limited e Kenmare Moma Processing Kenmare Moma Mining (Mauritius) Limited e Kenmare Moma Processing, sita os

escritórios na Av. Marginal 4985, Prédio Zen, 4°Andar, Cidade de Maputo, Telefone +25821499701 e Fax +25821499731'.

Localização do projecto

A nova área para mineração situa-se aproximadamente a 8km a sudoeste da mina existente de Namalope, concretamente na zona de Nataka, área pertencente Kenmare, dentro da Concessão existente da empresa (Concessão n°735C), distrito de Larde, Província de Nampula, nas coordenadas geográficas seguinte:

N/Orde	Latitude Sul	Longitude Este
01	16° 34′49.292"	39° 26′ 08.161"
02	16° 35′43.070"	39° 26′ 15.849"
03	16° 37′ 03.047"	39° 26′ 05.859"
04	16° 37′05.303"	39° 27′ 13.487"
05	16° 36′ 30.205"	39° 29′ 20.072"
06	16° 35′ 50.700"	39° 30′ 02.235"
07	16° 35′ 46.265"	39° 30′ 43.754"
08	16° 35′ 15.949"	39° 31′ 04.047"
09	16° 34′ 24.630"	39° 32′ 56.681"
10	16° 33′ 59.410"	39° 34′ 08.833"
11	16° 34′ 05.419"	39° 35′ 07.084"
12	16° 33′ 07.369"	39° 36′ 20.318"
13	16° 32′ 33.713"	39° 36′ 49.940"
14	16° 32′ 01.124"	39° 36′ 49.837"
15	16° 31′ 46.991"	39° 36′ 25.816"
16	16° 31′ 15.001"	39° 36′ 25.716"
17	16° 31′ 15.039"	39° 35′ 52.843"
18	16° 32′ 05.173"	39° 35′ 03.681"
19	16° 32′ 15.157"	39° 34′ 11.952"
20	16° 32′ 21.902"	39° 32′ 47.272"
21	16° 32′ 59.143"	39° 32′ 34.054"
22	16° 33′ 09.435"	39° 32′ 18.276"
23	16° 32′ 40.299"	39° 31′ 56.707"

24	16° 33′ 21.812"	39° 29′ 29.361"
25	16° 34′ 00.069"	39° 29′ 09.819"
26	16° 34′ 18.775"	39° 26′ 54.**486**"

Ocupação do solo

Quanto a situação da ocupação do solo, a empresa é possuidora de uma Concessão Mineira sob número 735 concedida pelo Ministério de Recursos Minerais do Governo de Moçambique para efeitos de exploração de areias pesadas, num período de 25 anos (Data de emissão 26 de Agosto de 2004).

Valor de Investimento

Para o presente projecto, foi declarado um valor de investimento avaliado em **150.000.000,00USD (Cento e Cinquenta milhões de Dólares Norte Americanas).**

Descrição da actividade

O projecto compreende como actividades a mineração de areais pesadas via mineração seco, Hidromineração e mineração de draga. Tem como actividades associadas que incluirão a construção de infra-estruturas que auxiliarão o processo de mineração.

Para o funcionamento pleno das actividade serão empregados um número de 637 trabalhadores na fase de implantação/construção e 90 indivíduos para o período de operação.

Infra-estruturas a serem erguidas na implantação do empreendimento:

- ✓ Estradas de acesso aos diversos pontos do empreendimento e de transporte de materiais, equipamentos, insumos e trabalhadores;
- ✓ Uma área de depósito de materiais e equipamentos de construção;
- ✓ Oficina para reparação de equipamentos e máquinas;
- ✓ Área de armazenamento de combustíveis, lubrificantes e óleo usado;
- ✓ Área para armazenamento de equipamento e pecas sobressalentes e consumíveis;
- ✓ Escritório para funcionários do local;
- ✓ Instalação para estação de tratamento de esgoto;
- ✓ Abertura de furos para o abastecimento de água potável e operacional;
- ✓ Condutas para fornecimento adicional de água potável e de reposição operacional;
- ✓ Reservatórios de água de processo;
- ✓ Medidas de segurança;

- ✓ Infra-estrutura eléctrica – OHL, subestação e
- ✓ Estrada/autovias para o transporte de CMP (HMC) para PSM (MSP).

A energia necessária para as operações propostas será distribuída a partir de uma subestação existente através de linhas 110KV ou 22KV da rede de electricidade de Moçambique, enquanto para água para o funcionamento de todo empreendimento será captada através das fontes superficiais e subterrâneas.

O projecto de exploração de areias pesadas de Nataka poderá afectar directamente em 09 comunidades seguintes: Tibane, Terra Batida, Jardone, Nampeia, Nahilokoni, Mahaka, Natalahi, Natuko e Nataka. Para além das comunidades poderá afectar também recursos naturais, infraestruras sociais inclusive o ecossistema.

Objectivo da deslocação

Cumprimento do preceituado no Regulamento sobre processo de Avaliação do Impacto Ambiental, nº 1 do Artigo 8 Decreto 54/2015 de 31 de Dezembro.

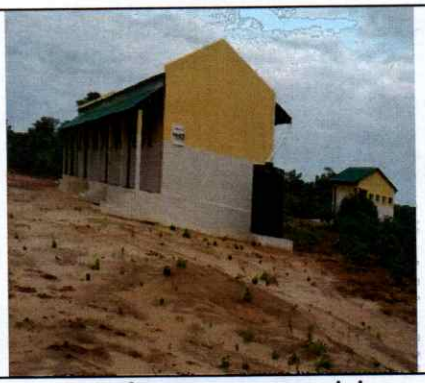
Roteiro da visita

De acordo com o plano de visita, foram vistas as seguintes áreas:

- O local para implantação do armazenamento de rejeitos de mineração;
- Comunidades a serem afectadas no acto da mineração;
- Áreas de influência directa e indirecta do projecto.

Constatações

I. Da visita feita ao local, constatou-se que a actividade está na fase preliminar decorrendo o processo de licenciamento ambiental;
II. Para a actividade de mineração serão afectadas directamente 9 comunidades de acordo com a relação acima descrita. Para além das comunidades, serão afectadas recursos naturais, ecossistemas, benfeitorias (machambas com culturas, espécies perenes, fruteiras).
III. Dentro da área em destaque verificou-se a existência de infra-estruturas sociais (escolas, Igrejas, fontes de água e Mesquitas)
IV. Não há conflitos de terras;
V. Não há questões fatais que possam impedir o processo de plantação de mineração;

		
Foto1. Benfeitorias na área directa	Foto2. Infra-estruturas sociais	Foto3. Residências na área directa
		
Foto4. Acessos das comunidades	Foto5. Machambas com culturas	Foto6. Residentes

Conclusão

Face aos aspectos identificados durante a visita, a análise feita com base nos documentos que regulam os processos de licenciamento ambiental, a equipa técnica concluiu que não há questões de natureza ambiental que possam impedir o prosseguimento das actividades do projecto.

Nestes termos, e, de acordo com alíneas a) do n°2.1 e o nº 2.5.5 do anexo II do Decreto 54/2015 de 31 de Dezembro, o projecto enquadra-se na **categoria "A"** devendo por isso ser objecto de AIA.

A anteceder o **EIA,** o proponente deverá submeter ao MTA o EPDA acompanhado dos respectivos Termos de Referencia (TdR) a cores em papel A4 e um suporte informático selado e 4 exemplares para o SPA de Nampula, feitos com base na Directiva Geral para a elaboração de Estudo de Impacto Ambiental aprovada pelo Diploma Ministerial nº129/2006 de 19 de Julho, para análise e tomada de decisão.

A equipa técnica

Gilberto Nipanga _____

Boaventura Manuel_____

Nampula, 07 de Junho de 2022

O Chefe da Repartição

Heles Adriano

/Técnico Superior N1/

APPENDIX 2: CES MTA CERTIFICATE

República de Moçambique

MINISTÉRIO DA TERRA, AMBIENTE E DESENVOLVIMENTO RURAL

CERTIFICADO DE CONSULTOR AMBIENTAL

Nº. 08 / 2019

O Ministério da Terra, Ambiente e Desenvolvimento Rural (MITADER), ao abrigo do Regulamento sobre o Processo de Avaliação do Impacto Ambiental, aprovado pelo Decreto nº 54/2015, de 31 de Dezembro, certifica-se que o (a) sr (a)

Coastal & Environmental Services Mozambique Limitada

está devidamente credenciado (a) a exercer funções de Consultor Ambiental em Moçambique.

Maputo, aos 11 / 02 /20 19 Validade até 11 / 02 /20 22

O Ministro