NAMISUN
ENVIRONMENTAL PROJECTS & DEVELOPMENT

PROPOSED TUMAS PROJECT AND ASSOCIATED INFRASTRUCTURE IN THE ERONGO REGION OF NAMIBIA

ENVIRONMENTAL MANAGEMENT PLAN

Prepared for: Reptile Uranium Namibia (Pty) Ltd

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Reptile Uranium Namibia (Pty) Ltd

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

ACRONYMS AND ABBREVIATIONS

Below a list of acronyms and abbreviations used in this report and / or the EIA Report.

Acronyms / Abbreviations	**Definition**
$(Pb(VO_3)_2)$	Lead Vanadate
^0C	Degrees Celsius
24/7	24 Hours per day/7 days per week
AC	Alternating Current
ADDAS	Automatic Digital Data Assembly System
Al	Aluminium
ALARA	As low as responsibly achievable
ALS	Analytical Laboratory Services
AMS	Accelerator Mass Spectrometry Radiocarbon
AMSL	Above Mean Sea Level
AMV	Ammonium Metavanadate
AQG	Atomic Questions Group
AQMP	Air Quality Management Plan
AQMP	AIR QUALITY MANAGEMENT PLAN
AQO	Air Quality Objectives
AQSR	Air Quality Sensitive Receptors
ARI	Average Recurrence Interval
As	Arsenic
AUSENCO	Ausenco Ltd
BID	Background Information Document
$Bq.m^{-3}$	Becquerels per cubic metre
CaO	Lime
CBD	Central Business District
CCD	Counter Current Decantation
CE	Control Efficiency
CIP	Continuous Improvement Programme
CLF	Cold Leach Feed
CLD	Cold Leach Discharge
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CPL	Causticisation / Causticised Product Liquor
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSP	Concentrated Solar Power
CTAN	Coastal Tourism Association of Namibia
dBA	Decibels A

DEA	Department of Environmental Affairs
DEEP YELLOW	Deep Yellow Ltd
DFS	Definitive Feasibility Study
DWA	Department of Water Affairs
DWNP	Directorate of Wildlife and National Parks
EAADT	Estimated Annual Average Daily Traffic
EAP	Employee Assistance Programme
EAPAN	Environmental Assessment Professionals Association of Namibia
EC	European Community
ECC	Environmental Clearance Certificate
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
ELSPE	Elspe Minerals (Pty) Ltd
EMA	Exponential Moving Average
EMP	Environmental Management Plan
EMS	Environmental Management Systems
EPA	Environmental Protection Agency
EPL	Exclusive Prospecting Licence
EWCN	Environment and Wildlife Consulting Namibia
F	Fluorine
FIP	Fire Indicator Panel
FNB	First National Bank
g	Gram
g/L	Gram per Litre
GDP	Gross Domestic Product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GLC	Ground Level Conditions
GRTC	Gobabeb Research and Training Centre
GWL	Groundwater Level
hr	Hour
H_2SO_4	Sulphuric Acid
ha	Hectare
HFO	Heavy Fuel Oil
HLD	Hot Leach Discharge
HLF	Hot Leach Feed
Hrs	Hours
I&APS	Interested and Affected Parties
IA	Impact Assessment
IAEA	International Atomic Energy Agency

IBA	Important Birding Area
ICP	International Preventions and Protocols
ICRP	International Commission on Radiological Protection
IEC	International Electrotechnical Commission
IFC	International Finance Corporation
INCA	Integrated Nuclear Communications Assessment
IPPR	Institute for Public Policy Research
IRR	Issues and Response Report
IUCN	International Union for Conservation Nature
JICA	Japan International Cooperation Agency
JSC	Junior School Certificate
K	Hydraulic Conductivity
kg	Kilogram
kL/t	Kilo Litres per ton
km	Kilometre
km^2	Square Kilometres
kt	Kilotonnes
kv	Kilovolt
L	Litre
Lb	Pound
LC	Lead Carbonate
LD	Lead Vanadate
LHU	Langer Heinrich Uranium (Pty) Ltd
LOM	Life of Mine
m	Metre
m/d	Metres per Day
m/s	Metres per Second
m^2/d	Square Metre per Day
m^3	Cubic Metre
m^3/a	Cubic Metres per Annum
m^3/ha	Cubic Metre per Hectare
MAWLR	Ministry of Agriculture, Water and Land Reform
mBq	Millibecquerels
McEAC	Ministry of Education, Arts and Culture
MEFT	Ministry of Environment, Forestry and Tourism
MET	Ministry of Environment and Tourism
MF	Media Filter
MFIP	Main Fire Indicator Panel
mg/kg	Milligrams per Kilogram

mg/L	Milligram per Litre
mg/m^3	Milligrams per cubic metre
MIT	Ministry of Industrialisation, Trade and SME (Small and Medium Enterprise Development)
ML	Mining Licence
MLb	Million Pounds
mm	Millimetre
MME	Ministry of Mines and Energy
Mn	Manganese
MoE	Ministry of Education
MoHSS	Ministry of Health and Social Services
MoL	Ministry of Labour, Industrial Relations and Employment Creation
MSDS	Mineral Safety Data Sheet
mSv	Millisievert
$mSv.a^{-1}$	Millisievert per annum
Mtpa	Million Tonnes Per Annum
MVA	Mega Volt Ampere
MW	Megawatts
MWe	Mega Watt Electric
MWp	Mean Wedge Pressure
MWT	Ministry of Works and Transport
N	Nitrogen
Na_2CO_3	Sodium Carbonate
$NaClO_3$	Sodium Chlorate
NamPower	NamPower Ltd
NamWater	NamWater Ltd
NaOCl	Sodium Hypochlorite
NaOH	Sodium Hydroxide
NBRI	National Botanical Research Institute
NCE	Namibian Chamber of Environment
NDVI	Satellite Derived Greenness Indicator
NF	Nano Filtration
NGFM	Numerical Ground Flow Model
NIMT	Namibian Institute of Mining and Technology
NNNP	Namib Naukluft National Park
NORM	Naturally Occurring Radioactive Material
NOx	Nitrogen Oxide
NPC	National Planning Commission
NRPA	National Radiation Protection Authority

NSA	Namibia Statistic Agency
NSSCO	Namibian Senior School Certificate Ordinary level
NUR	Namib Uranium Rush
OHL	Overhead Line
OSL	Optically Stimulated Luminescence
P	Phosphorus
Pb	Lead
PbO	Lead Oxide
PbO_2	Lead Dioxide
$PbSO_4$	Lead Sulphate
PFS	Pre-Feasibility Study
pH	Potential Hydrogen
PLS	Pregnant Leach Solution
PM	Particulate Matter
Po	Polonium
PPE	Personal Protective Equipment
ppm	Parts Per Million
PPP	Public Participation Process
PSD	Particle Size Distribution
PV PLANT	Photovoltaic Plant
QRS 174/36	Basecamp Site Numbering
RA	Namibian Roads Authority
Ra^{224}	Radon
Ra^{226}	Radon
RAI	Radiological Impact Assessment
RAPP	Rangeland Planted Pasture Productivity
RMR	Reptile Mineral Resources and Exploration (Pty) Ltd
Rn^{220}	Thoron
Rn^{222}	Radon
RO	Reverse Osmosis
Ra	Radium
ROM	Run of Mine
RUN	Reptile Uranium Namibia (Pty) Ltd
SANAAQS	South African National Ambient Air Quality Standards
SANDCR	South African National Dust Control Regulation
SADC	South African Development Community
SAIEA	Southern African Institute for Environmental Assessment
SANS	South African National Standards
SBL	Sodium Barren Liquor

SDU	Sodium Diuranate
SEA	Strategic Environmental Assessment
SEMP	Strategic Environmental Management Plan
SMBS	Sodium Metabisulphate
SMP	Stormwater Management Plan
SO_2	Sulphur Dioxide
SOP	Standard Operating Procedure
S-Pan	Symonds Pan
SSA	Standards South Africa
SSWSS	Swakopmund South Water Supply Scheme
Sv	Sievert
t	Tonne
T	Transmissivity
TDS	Total Dissolved Solids
Th	Thorium
tpa	Terephthalic Acid
TPA	Test Pumping Analysis
TRS	Thermal Radiation Simulator
TSF	Tailings Storage Facility
U	Uranium
U^{238}	Uranium Isotope
UBL	Uranium Barren Liquor
UF	Ultra-Filtration
$\mu g/m^3$	microgram per cubic metre
UNAIDS	United Nations Programme on HIV/AID
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNSCEAR	Unite Nations Educational, Scientific Committee on the Effects of Atomic Radiation
UO_2SO_4	Soluble Uranyl Sulphate
UO_3	Uranium Trioxide
U_3O_8	Uranium Oxide
URE	Uranium Refinery Effluent
µSv/a	Micro Sievert per annum
V	Vanadium
V_2O_5	Vanadium Pentoxide
VAT	Value Added Tax
VBL	Vanadium Barren Liquor
VCE	Vanadium Conversion Effluent
VISION 2030	National Planning Commission 2004
VKT/day	Vehicle Kilometres Travelled per day

VO_2O_4	Vanadyl Sulphate
VOC	Volatile Organic Compounds
VPL	Vanadium Product Liquor
VRE	Vanadium Refinery Effluent
W/R	Water Ratio
WHO IT-3	World Health Organisation Interim Targets
WRD	Waste Rock Dump
WTY	Waste Transition Yard
WWF	World Wildlife Fund in Namibia

1 INTRODUCTION

1.1 PROJECT BACKGROUND

Reptile Uranium Namibia (Pty) Ltd (RUN) plans to implement the proposed Tumas mining and processing Project ('the Project'). The Project area is located in the Namib Naukluft National Park (NNNP) in the Erongo Region of Namibia, approximately 40 km east from Walvis Bay and can be reached via the C28 or the C14 roads. (See Figure 1).

The various Project activities and infrastructure proposed for the Tumas Project can broadly be summarised as follows:

- Open pit mining.
- Ore transported with haul trucks to the onsite plant for processing.
- Mineral and non-mineral waste from the mining and processing activities to be disposed of at onsite facilities (Waste Rock Dumps (WRDs) and Tailings Storage Facilities (TSFs)).
- Use of reagents for processing.
- Water supply and storage as well as power supply to the mining and processing activities. Two separate Environmental Management Plans (EMPs) for the proposed water supply pipeline and the overhead powerline to the proposed Tumas Project are attached as Appendices 17 and 18 to the EIA Report for the Tumas Project.
- Final product, uranium oxide (U_3O_8) and by-product, vanadium pentoxide (V_2O_5) exported for end use or further processing.

The Tumas Project includes the Tumas 1, Tumas 2, Tumas 3, Tumas 1 East and Tubas Red Sand/Calcrete orebodies. The deposits fall within the boundaries of EPLs 3496 and 3497 and the proposed ML area (see Figure 1 and Figure 2).

RUN submitted an application to apply to the MME to convert, in part, its Exclusive Prospecting Licences (EPLs) 3496 and 3497 to a Mining Licence (ML). RUN is a wholly owned subsidiary of Reptile Mineral Resources and Exploration (Pty) Ltd (RMR) who manages and conducts the exploration activities on RUN's tenements. RUN and RMR are both wholly owned subsidiaries of Deep Yellow Ltd. (Deep Yellow), an Australian listed company.

The Ore Reserve estimate for the Pre-Feasibility Study (PFS) was based on the Indicated Resource inventory of the Tumas Project. This limitation resulted in a life of mine (LOM) for the PFS of 11.5 years. Since the completion of the PFS, further work has been undertaken on the Tumas Project resources and reserves. Deep Yellow announced a significant increase in Reserves and a subsequent increase in the estimated operating life for the Project in 2021. Using similar annual operating throughput and uranium production, the Project is now estimated to have an operating life of around 26 years with additional resources that may still be converted to Reserves in the future, thereby further increasing the operating life of the Project.

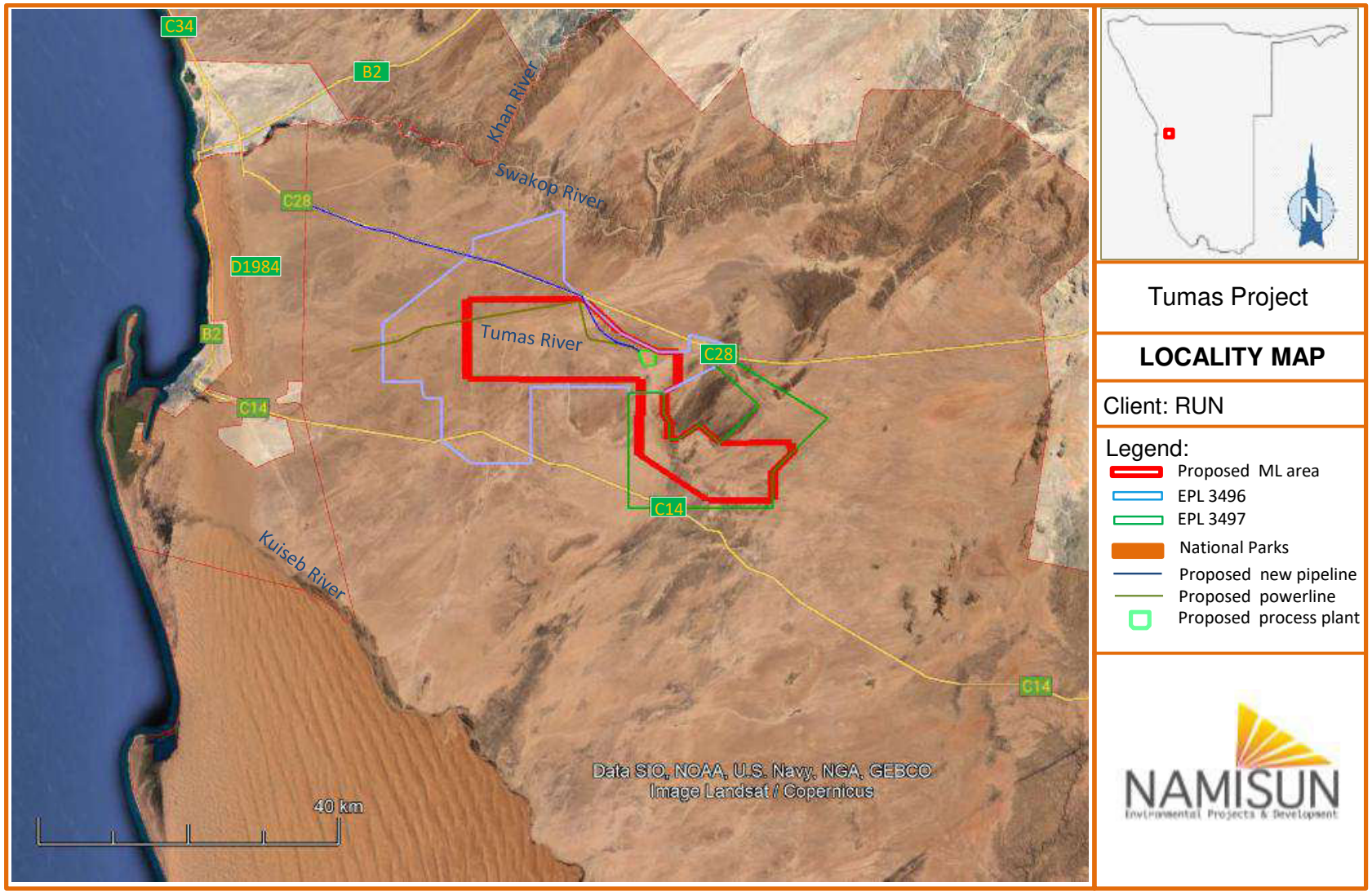

FIGURE 1: REGIONAL LOCALITY OF THE TUMAS URANIUM PROJECT AREA (REF. GOOGLE EARTH)

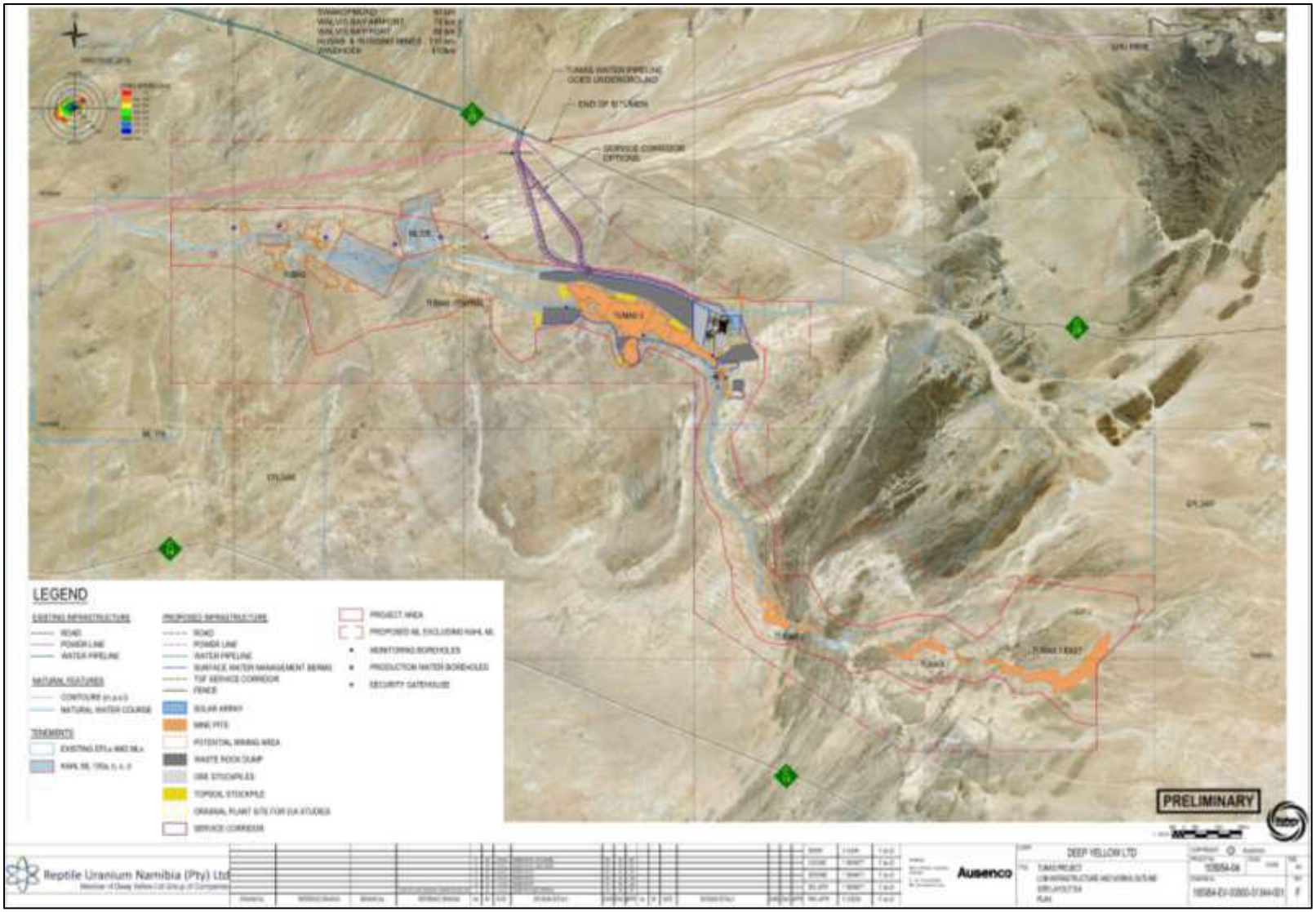

FIGURE 2: PROPOSED LAYOUT OF THE TUMAS PROJECT MINING AND PROCESSING INFRASTRUCTURE AND FACILITIES

RUN envisions developing a mine with various open-pits and a processing plant in the Tumas Project area that will produce both uranium oxide (U_3O_8) and vanadium pentoxide (V_2O_5) as a by-product.The uranium oxide will be calcined prior to packaging, referred to as yellow cake (although the colour of this material is dark bottle green).

Refer to Figure 3 for the conceptual layout of the mining and processing infrastructure and Figure 5 for a conceptual illustration of the components of the proposed Project.

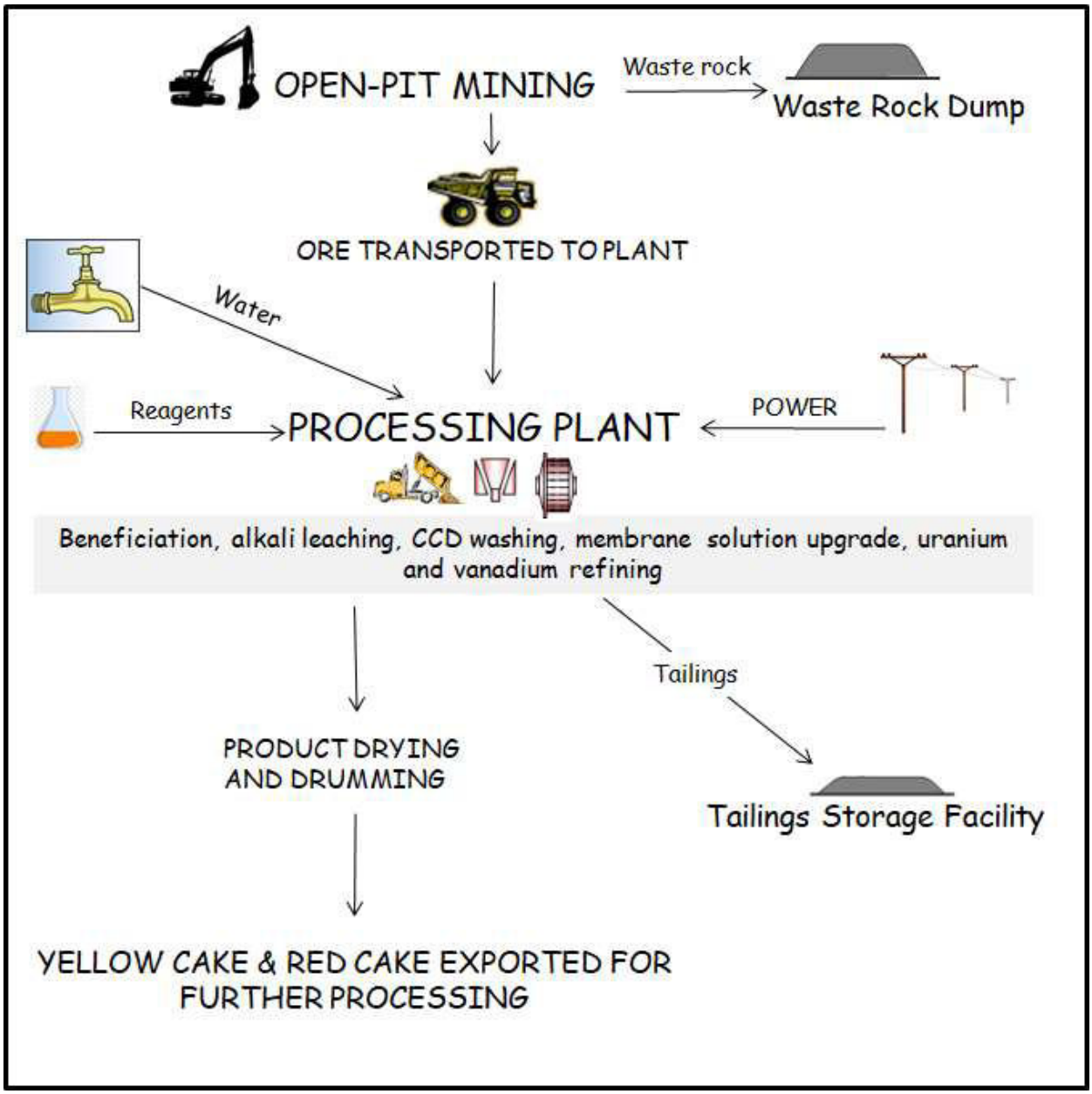

FIGURE 3: CONCEPTUAL DIAGRAM OF THE PROJECT COMPONENTS

1.2 AIM OF THE DOCUMENT

The aim of the Environmental Management Plan (EMP) is to detail the actions required to effectively implement design requirements, management and mitigation measures and monitoring requirements. These actions are required to minimise negative impacts and enhance positive impacts relating to the activities and infrastructure associated with the proposed Tumas Project.

The EMP provides the environmental commitments, which will be implemented by RUN.

1.3 KEEPING THE EMP UP TO DATE

RUN will conduct regular reviews of the EMP should circumstances change with respect to the Project.

Should a listed activity(s) as defined in the Environmental Impact Assessment Regulations: Environmental Management Act (EMA), 2007 (Government Gazette No. 4878) be triggered (as a result of future modifications/changes), this EMP will be required to be updated through another EIA process as stipulated in the EMA and its Regulations.

Due to the nature of the commitments in this EMP an adaptive management approach needs to be followed (see section 9), certain commitments may therefore require amendment from time to time.

1.4 DETAILS OF THE PERSONS WHO PREPARED THIS EMP

RUN appointed Namisun Environmental Projects and Development (Namisun), as an independent environmental consulting company to undertake the required EIA process, to compile the EIA Report and the accompanying EMP as part of the application process for the environmental clearance to the Ministry of Environment, Forestry and Tourism (MEFT): Department of Environmental Affairs (DEA).

This document, the EMP for the proposed Tumas Project, was compiled by Namisun.

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

Furthermore, the management and mitigation measures (i.e. actions) and monitoring requirements documented in this EMP were developed by Namisun and the team of Environmental Specialists. The requirements provided in the following specialist reports are included in chapters 6, 7 and 8:

- Biodiversity:
    - Vegetation Assessment (Enviroscience, 2022) (Appendix 8 of the EIA Report).
    - Terrestrial Fauna Assessment (Environment and Wildlife Consulting Namibia, 2022) (Appendix 9 of the EIA Report).
    - Integrated Biodiversity (including invertebrates baselines description) Agri Ecological services, 2022) (Appendix 10 of the EIA Report).

- Surface Water Assessment (SLR, 2022a) (Appendix 6 of the EIA Report).
- Groundwater Assessment (SLR, 2022b) (Appendix 7 of the EIA Report).
- Radiological Assessment (VO Consulting, 2022) (Appendix 13 of the EIA Report).
- Air Quality Assessment (Airshed Planning Professionals, 2022) (Appendix 11 of the EIA Report).
- Noise Assessment (Soundscape Consulting, 2022) (Appendix 12 of the EIA Report).
- Archaeology Assessment (J. Kinahan Archaeologist, 2022) (Appendix 14 of the EIA Report).
- Socio-Economic Assessment (Ashby Associates CC, 2022) (Appendix 15 of the EIA Report).

2 PURPOSE AND SCOPE OF THE EMP

This EMP contains a series of management plans (MPs) with mitigation measures designed to meet the legal requirements and to minimize or avoid the negative impacts and enhance the positive impacts associated with the proposed Tumas Project during the construction, operational, decommissioning and closure phases. These plans are based on the overall management objectives for the various environmental and social aspects which have been identified in the EIA process.

In addition, the EMP identifies parties at an early stage of project development to implement the required design requirements, management and mitigation measures and monitoring requirements through all phases of the project, from design to operational phase.

The commitments contained in this EMP, as modified from time to time, form the overarching contractual agreement with the Namibian authorities for sound environmental management. All employees, contractors and sub-contractors and any visitors to site will be expected to comply with the commitments contained in the EMP.

2.1 STRUCTURE OF THE EMP

The structure of this EMP is outlined in Table 1, following largely the requirements as set out in Section 8 of the EIA Regulations (2012), promulgated under the Environmental Management Act, No. 7 of 2007.

TABLE 1: REPORT STRUCTURE

Component	Report reference
(a) Details of the EAPs who prepared the EMP and the expertise of the EAPs	Section 1.4
(b) An identification of relevant laws and guidelines	Chapter 3
(c) A detailed description of the aspects that are covered by the EMP	Section 1.1 and Chapter 4
(d) Information about the proposed management and mitigation measures to be undertaken to address the identified impacts	Chapters 5, 6 and 7
(e) Responsibilities and timeframes within which the measures contemplated in the EMP must be implemented	Chapter 6.2
(f) Proposed mechanisms of monitoring compliance with the EMP and reporting on it	Chapter 8

3 ENVIRONMENTAL LEGAL FRAMEWORK

3.1 LEGISLATION

This section outlines Namibian legislation which is relevant to the Proposed Tumas Project and with which RUN must comply with. RUN will also comply with relevant international best practice and procedures.

Table 2 provides a summary list of the relevant legislation and regulatory frameworks.

TABLE 2: LIST OF LEGISLATION RELEVANT TO THE TUMAS PROJECT

Year	Name
Current Namibian legislation	
1990	The Constitution of the Republic of Namibia of 1990
1990	Nature Conservation General Amendment Act of 1990, the Nature Conservation Amendment Act, No.5 of 1996, and the Nature Conservation Amendment Act, No. 3 of 2017
1990	Petroleum Products and Energy Act, No. 13 of 1990
1992	The Labour Act, No. 6 of 1992
1992	Minerals (Prospecting and Mining) act, No. 33 of 1992
1992	The Regional Councils Act, No. 22 of 1992
1994	Social Security Act, No. 34 of 1994
1997	Regulations relating to the Health and Safety of Employees at Work (promulgated in terms of Section 101 of the Labour Act, No. 6 of 1992 (GN156, GG 1617 of 1 August 1997)
1998	Affirmative Action (Employment) Act, No. 29 of 1998
1997	Namibian Water Corporation Act, No. 12 of 1997
1998	The Health Act, No. 21 of 1998
1998	Affirmative Action Act, No. 29 of 1998
1999	Road Traffic and Transport Act, No. 22 of 1999
2000	Value-added tax Act, No. 10 of 2000
2001	The Forestry Act, No. 12 of 2001 as amended by the Forest Amendment Act, No. 13 of 2005 and its regulations of 2015
2003	Pollution Control and Waste Management Bill (3rd Draft September 2003)
2004	National Heritage Act, No. 27 of 2004
2007	Electricity Act, No. 4 of 2007
2007	Environmental Management Act, No. 7 of 2007 and its regulations of 2012
2007	Labour Act, No. 11 of 2007
2013	Water Resources Management Act, No. 11 of 2013
2015	Public and Environmental Health Act, No. 1 of 2015
2016	Civil Aviation Act, No. 6 of 2016 and the Namibia Civil Aviation Regulations of 2001, as amended in 2018
Former South African legislation still relevant in Namibia	
1919	Public Health Act, No. 36 of 1919
1956	Explosives Act, No. 26 of 1956

Year	Name
1956	The Water Act, No. 54 of 1956
1969	Soil Conservation Act, No. 76 of 1969 and the Soil Conservation Amendment Act, No. 38 of 1971
1974	Hazardous Substances Ordinance, No. 14 of 1974
1975	Nature Conservation Ordinance, No. 14 of 1975 (as amended)
1976	Atmospheric Pollution Prevention Ordinance, No. 11 of 1976
1981	Income Tax Act, No. 24 of 1981
Namibian policies	
1994	Policy for the Conservation of Biotic Diversity and Habitat Protection
1994	Namibia's Environmental Assessment Policy for Sustainable Development and Environmental Conservation
1998	White Paper on the Energy Policy of Namibia
2000	National Water Policy White Paper
2004	Namibia Vision 2030
2010	National Climate Change Policy of Namibia
2014	National Biodiversity Strategy and Action Plan (NBSAP) 1 (2002) and 2 (2014)
2017	National Development Plan, 2017/2018 – 2021/2022, guided by Vision 2030.
2018	National Policy on Prospecting and Mining in Protected Areas, 2018
International laws to which Namibia is a signatory	
1973	The Convention on International Trade in Endangered Species (CITES)
1985	Vienna Convention for the protection of the ozone layer
1987	Montreal Protocol on substances that deplete the ozone layer
1989	The Basel Convention on the control of trans-boundary movements of hazardous wastes and their disposal
1989	The Rotterdam Convention on the prior informed consent procedure for certain hazardous chemicals and pesticides in international trade
1992	The Rio de Janeiro Convention on Biological Diversity
1992	The Rio de Janeiro Convention to Combat Desertification
1992	United Nations Framework Convention on Climate Change

The MEFT and the MME released the “National Policy on Prospecting and Mining in Protected Areas” in June 2018. This Policy guides decision making with regards to exploration and mining in protected areas. The vision of the Policy is to “develop integrated and sustainable prospecting and mining in Namibia to support economic growth, whilst maintaining the integrity of ecosystems and natural resources, and avoiding degradation of areas highly sensitive for their ecological, social and/or cultural heritage value”. The Policy provides, amongst others “protected areas with specific zones to be excluded from Prospecting and Mining”. The proposed ML and Project area fall within the NNNP and is located within such a zone identified as “Management Areas – National Park”.

MEFT developed a new Management Plan for the NNNP which provided guidelines in terms of revised management areas and management measures (MEFT, 2021). This Management Plan provides, amongst others, an overview of the NNNP; guidelines on the park management objectives, zonation and landscape-level conservation and development. It also describes conservation and management of biodiversity principles, cultural and historical, archaeological and paleontological assessments and refers to adaptive management concepts and relevant infrastructure in the park.

RUN takes cognisance of the above-mentioned Policy and Park Management Plan and guidelines where relevant.

3.2 PERMITS AND AUTHORISATIONS

As part of the ML application process, an EIA Report will be submitted to the Ministry of Mines and Energy (MME) (Competent Authority) and the MEFT: DEA. An EMP must also be submitted and approved by the relevant authorities to comply with the EIA Regulations of January 2012, promulgated under the Environmental Management Act, 2007 (Act No. 7 of 2007).

This EMP has therefore been developed in compliance with the above-mentioned Act and regulations and will form the foundation for managing potential environmental impacts. It will be implemented for the life of the Tumas Project.

If the Final EIA Report and EMP are approved, MEFT will issue an Environmental Clearance Certificate (ECC). An ECC is required prior to the implementation of the proposed Tumas Project (i.e. mining, processing and associated activities).

Table 3 summarises the notification, registration, approval and permits required, relating to environmental aspects for the proposed Tumas Project. Table 4 summarises the permits and certificates that may require application prior to the start of mining.

TABLE 3: LIST OF LEGISLATION RELEVANT TO THE TUMAS PROJECT

Aspect	Requirement / authority
Mining Licence (RUN submitted an application to apply for an ML)	Approval (i.e. ECC) of EIA and accompanying EMP by the Ministry of Mines and Energy (MME) and MEFT MME issues MLs
Written permission of the Mining Commissioner to erect accessory works	Written permission from the Mining Commissioner (MME)
Permission to sell, discharge, etc. minerals mined	Permission from the Mining Commissioner (MME)
Permit to store and handle explosives on site	Permit from the Namibian Police
Purification and or discharge of wastewater or dirty water including tailings to the TSFs	Permit for industrial wastewater and effluent disposal from the Directorate of Water Affairs at the Ministry of Agriculture, Water and Land Reform (MAWF)
Water abstraction permit	Permit for groundwater abstraction from MAWF
Picking and transport of protected plants	Plant removal permit, approval by the landowner or Directorate of Parks and Wildlife at MEFT or the Namibia Botanical Research Institute (NBRI)

Picking, removal of protected plants	Permit from Directorate of Parks and Wildlife at MEFT
Registration, selling, operating, installing of infrastructure related to Group I and III hazardous substances	Licences from the MEFT and Ministry of Health and Social Services (MoHSS) required for the sale, use and storage of "hazardous substances", which are specified in certain groups.
Disturbing or destroying of national heritage, archaeological or paleontological sites	Permit from the National Heritage Council
Consumer installation certificate	Certificate / license from the Directorate Petroleum Affairs of MME
Actions to be taken after a spill has occurred (major petroleum spill means 200 L per spill)	Notify Directorate Petroleum Affairs of MME
30-days notification prior to commencement of construction	Notify the Ministry of Labour, Industrial Relations and Employment Creation (MLIREC)
Notification prior to commencement of construction	Notify MME and MoHSS
30-days notification prior to commencement of mining operation	Notify the MLIREC
Transport / operating licence to transport goods on public roads	Licence from the Ministry of Works and Transport (MWT)
Approval to work on Sundays, public holidays, and continuous operation	Approval from the MLIREC
Register for VAT	Certification from the Ministry of Finance (MoF)
Register for tax	Certification from MoF
Register for Social Security	Register at the MLIREC
Valid Affirmative Action compliance certificate	Certification from MLIREC

TABLE 4: LIST OF PERMITS OR CERTIFICATES THAT MAY BE REQUIRED

Permit / certificate	Regulator
Mining Licence	MME
ECC	MEFT
Purification or discharge of wastewater or dirty water	MAWLR
Water abstraction permit	MAWLR
Licence for explosives magazine	MME / Namibian Police
Explosive packaging burning permit	MME
Picking, removal of protected plants	MEFT
Permit for the construction camp on site	MEFT

3.3 NNNP PARK RULES

The NNNP rules need to be adhered to. Refer to Appendix A for a copy of the park rules.

Furthermore, with reference to section 3.1 MEFT developed a new Management Plan for the NNNP which provided guidelines in terms of revised management areas and management measures.

3.4 EQOS FROM THE SEA

In 2009, the MME, after obtaining funding from the German Federal Institute for Geo-science and Natural Resources (BGR), appointed the Southern African Institute of Environmental Assessment (SAIEA) to conduct a Strategic Environmental Assessment (SEA) for the Uranium Rush in the Erongo Region (SAIEA, 2011).

The Strategic Environmental Management Plan (SEMP), which was the outcome of the SEA, is an over-arching framework and roadmap to address the cumulative impacts of existing and potential developments, within which individual projects have to be planned and implemented. Annual SEMP reports measure the performance around twelve Environmental Quality Objectives (EQOs) that show the extent to which uranium mining is impacting the central Namib. Each EQO articulates specific goals and targets that are monitored by a set of key indicators.

The EQOs, relevant to the proposed Tumas Project, can be found in Appendix B. These will be considered by RUN during the development of the Project.

4 ENVIRONMENTAL MANAGEMENT SYSTEM (ASPECTS AND IMPACTS)

RUN will introduce the development and implementation of an Environmental Management System (EMS) during the implementation of the proposed Tumas Project and associated activities and infrastructure. The use of the EMS will ensure that the environmental management requirements on the activities of the project are not only properly planned for, but a robust mechanism for implementation is also ensured and, most importantly, that the environmental management function is always reviewed in a spirit of continual improvement.

This EMP will be a component of the EMS and all the associated procedures, work instructions, etc. will be developed taking cognizance of the relevant commitments in this EMP.

As part of the EMS development, RUN and the relevant contractors will roll out the Management and Mitigation Plans (MMPs) in this EMP and develop detailed work instruction / procedures to ensure the objectives provided in this EMP are achieved and commitments are implemented. Responsibilities and target dates for implementing relevant commitments will therefore be included in the work instructions / procedures and other relevant documents.

4.1 ENVIRONMENTAL ASPECTS AND IMPACTS

Understanding the biophysical and human environment in which the proposed Project is located, is the first step to understanding the relevant impacts. The next and possibly more important step is to identify the environmental aspects that give rise to the impacts. All these aspects have the potential to cause impacts on the environment (or third parties) in a different way. Successful management will be gauged by how well RUN avoids, minimises or mitigates all the impacts associated with each environmental aspect.

Potential environmental impacts were identified by Namisun in consultation with I&APs, regulatory authorities, specialist consultants and RUN during the Scoping phase of the EIA. The key potential impacts identified, are assessed in the EIA Report for the proposed Tumas Project (see chapter 7).

Table 5 provides a summary of the key potential cumulative impacts associated with the proposed Tumas Project, as assessed in the above-mentioned EIA Report. Relevant management and mitigation measures, to address these potential impacts, as well as other general aspects, are presented in the MMPs in Chapter 7.

TABLE 5: SUMMARY OF KEY POTENTIAL CUMULATIVE IMPACTS ASSOCIATED WITH THE PROPOSED TUMAS PROJECT

Environmental component	Environmental issues (i.e. environmental and social aspects / potential impacts)	Assessment Significance Rating	
		Unmitigated	Mitigated
Biodiversity	Impacts on vegetation:		
	• Loss of vegetation and associated biota due to mine development and associated infrastructure within the project area	H	M
	• Loss of individuals of species with special conservation status (protected, red-listed, Cites or endemic)	H	M
	• Loss of vegetation and associated biota due to the construction work force	M	L
	• Effect of dust on vegetation	M	L-M
	• Loss of *Salsola nollothensis* hummocks in project area	H	M
	• Change of habitat due to impact on water resources	H	M
	• Loss of environmentally sensitive areas	H	M
	Impacts on vertebrate fauna	M	L-M
	Impacts on invertebrates and ecological impacts:		
	• Loss of key resource area, key-stone species and high-value habitat	VH	M
	• Disruption of animal movement, gene flow and migratory patterns, fragmentation of populations using the Tumas valley	H	M
	• Backfilling mined pits with unsuitable and polluted substrates affects riparian ecosystems	H	L
	• Light pollution affecting especially invertebrates	M	L
	• Loss of soil resources	M-H	L
Surface water	Surface Water Contamination	H	M
Groundwater	Groundwater over-abstraction has a negative impact on the groundwater levels:		
	• Construction phase	M	L
	• Operational phase	H	L
	Groundwater quality impacts:		
	• Seepage from the tailings and WRDs into underlying paleochannel and basement aquifers have an impact on the groundwater quality	H	M
	• Seepage from TSFs and WRDs due to rising phreatic levels and over-deposition result in pollution plume in the shallow alluvium	H	L
	• Mineralised Storage facilities (TSF, WRD) have a negative impact on the groundwater quality at the at the ecological sensitive areas A and B	H	L
	• Non-mineral wastes have a negative impact on groundwater quality	M	L

	• Chemical reagents used in the processing plant have a negative impact on groundwater quality	**M**	**L**
	• Domestic effluent waste has a negative impact of groundwater quality	**M**	**L**
Air Quality	Air pollution - Scenario 1:		
	• $PM_{2.5}$	**L**	**L**
	• PM_{10}	**M**	**L**
	• Dustfall	**M**	**L**
	• NO_2, CO, SO_2, VOC	**L**	**L**
	Air pollution - Scenario 2:		
	• $PM_{2.5}$	**L**	**L**
	• PM_{10}	**L**	**L**
	• Dustfall	**L**	**L**
	• NO_2, CO, SO_2, VOC	**L**	**L**
Radiological	Radiological impacts to third parties (i.e. public receptors)	**L**	**L**
Noise	Noise disturbance to third parties (closest receptors)	**L**	**L**
Archaeology	Damage to archaeological sites and landscape	**H**	**M**
Visual	Visual and landscape disturbance	**H**	**M**
Socio-economic	Economic impacts: Construction and Operations phases	**VH+**	**VH+**
	Economic impacts: Decommissioning and closure phases	**H**	**H**
	Job creation: Construction and Operations phases	**VH+**	**VH+**
	Job creation: Decommissioning and closure phases	**H**	**H**
	Temporary Housing on Site, during Construction:		
	• Poaching	**M**	**L**
	• Littering	**H**	**M**
	• Social ills	**H**	**M**
	In-migration and Housing in coastal towns	**H**	**M**
	Traffic impacts	**H**	**L-M**

5 OVERALL ENVIRONMENTAL OBJECTIVES FOR THE EMP

The following overall environmental objectives have been set for the activities associated with the proposed Project, to be implemented by RUN:

- To comply with national legislation and standards for the protection of the environment.
- To limit potential impacts on biodiversity through the minimisation of the footprint of activities associated with the construction of the various Project facilities and infrastructure; and the conservation of residual habitats as far as possible.
- To keep key stakeholders informed about the Project's activities, where relevant.
- To limit contaminated effluent discharge into the environment through the containment, recycling or removal of contaminated water.
- To protect soils and groundwater resources through the implementation of measures for spill prevention and clean-up.
- To ensure the legal and appropriate management and disposal of general and hazardous waste, through the implementation of a strategy for the minimisation, recycling (where possible), management, temporary storage and removal of waste.
- To protect heritage resources by thorough documentation and obtaining of the necessary approvals, where relevant.
- Formulate mitigation strategies to optimise (i.e., minimise) public exposure doses that may potentially result from the proposed mining operations at the Project, where these are relevant and applicable under Namibian as well as international radiation protection provisions and best practices in the field of uranium mining and processing
- To undertake progressive rehabilitation as mining progresses.
- To support and encourage environmental awareness (and where relevant training) and responsibility amongst all employees and service providers.
- To prevent pollution and clean up if incidents occur.
- To incorporate the relevant requirements stipulated in this EMP into the programme of activities, design and contracts.
- To develop, implement and manage monitoring systems to ensure good environmental performance and reporting: Ground and surface water, radiation, air quality, biodiversity, soil and noise.
- To ensure that all the employees and contractors adhere to the relevant management commitments.
- Ensure compliance to the EMP and other relevant conditions or approvals (ECC and other relevant permits and Park Rules).

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6 GENERAL MANAGEMENT AND MITIGATION REQUIREMENTS

The following sections list the (generic) management measures that are relevant to all project activities / facilities, including the Tumas mine and associated activities; as well as, largely, the proposed new water pipeline and powerline to the mine. Further (specific) management and mitigation measures are documented in the 'stand-alone EMPs' for the water pipeline and powerline (attached as Appendices 17 and 18 of the EIA Report for the proposed Tumas Project).

6.1 DEFINE ROLES AND RESPONSIBILITIES FOR THE IMPLEMENTATION OF THE EMP

The following management actions need to be implemented:

All phases of project development:

- Ultimate responsibility for the implementation of and compliance with all of the EMP requirements rests with RUN.
- RUN will nominate an Environmental Manager who will to be responsible for implementation, monitoring and auditing of compliance with the EMP.
- The Environmental Manager will ensure regular compliance checks during operations. Records will be kept.
- RUN will ensure that all contractors and sub-contractors are aware of and familiar with site operations, the key environmental issues and consequences of non-compliance to the EMP.
- Adherence to the ECC, the EMP and RUN policies / procedures will be included as a contractual requirement.
- RUN will appoint or nominate capable and suitably qualified environmental personnel to monitor all environmental aspects and EMP compliance.
- RUN will provide the Environmental Department with the necessary resources and authority to implement and monitor the EMP.

Construction phase:

- RUN will nominate a Construction Manager to be responsible for overseeing construction of the project in compliance with the EMP.
- The Construction Manager will be responsible for implementation, monitoring and auditing of compliance with the EMP during construction.
- The Construction Manager will ensure regular compliance checks during any construction period. Records are to be kept.
- All contractors will be provided with a copy of the EMP and all Environmental Emergency Response Plans.
- Each contractor will provide RUN with a signed letter indicating their acknowledgement of the conditions of the ECC, the EMP and RUN policies.
- Contractors are responsible for compliance with the EMP for all aspects of their work package.
- Any incident or non-compliance must be immediately reported to RUN.

6.2 PARTIES RESPONSIBLE FOR THE IMPLEMENTATION OF THE EMP

This section further describes the roles and responsibilities for implementing the various management plans.

6.2.1 RUN GENERAL MANAGER (GM)

The RUN GM has *overall responsibility* for environmental management on the mine site and for ensuring this EMP is implemented by the appointed Environmental Manager.

6.2.2 TUMAS PROJECT MANAGEMENT TEAM

The Management Team must ensure the EMP is included in all contracts and to ensure that contractors adhere to the conditions of the EMP.

Contract documents should consider the inclusion of penalties for non-conformance to the EMP, or to link the sign off of the Contract to a retainer clause whereby RUN could retain part of the contract fees until the Mine Manager has signed off the contract, indicating satisfaction with the rehabilitation of the Contractor's work and laydown area(s).

The Managers shall be responsible for responding to any actual environmental emergencies that occur within their relevant sections.

The Management Team shall also ensure that sufficient financial and human resources are available at short notice to implement emergency procedures, and to take corrective action pro-actively when environmental risks are evident in advance.

6.2.3 ENVIRONMENTAL MANAGER

The Environmental Manager will be responsible for assisting the Management Team in all environmental and community related issues, and specifically to ensure that the commitments as set out in this EMP are implemented during the construction, operations, decommissioning and closure phases.

In addition to the above, the Environmental Manager is responsible for ensuring that all persons (including, amongst others, contractors) involved with the Tumas Project comply with this EMP.

The Environmental Manager will be responsible for the following aspects related to compliance of this EMP:

- Develop and implement a suitable Environmental Management System (EMS) – ensuring this EMP forms the basis of the EMS.
- Regular inspections and auditing compliance to the EMP and any other relevant legal requirements e.g. permits and authorisations.
- Conduct environmental awareness training during induction training and on an ad hoc basis thereafter.
- Conduct scheduled monitoring as outlined in various sections in the EMP as well as any additional monitoring required by permit and authorisations issued to the mine by relevant authorities.

- Ensure compliance to the EMP and permits and authorisations issued to the mine by relevant authorities thought inspections and audits. Ensure responsibilities and target dates are developed for each one of the commitments in the EMP. This will be through one of the following mechanisms:
    - Design requirements; or
    - Construction tender documents and contracts;
    - Site policies, procedures and standards; and / or
    - EMS (work instructions and procedures).
- Submit required information to relevant authorities such as reporting related to monitoring and with regard to compliance with the EMP, permit and relevant authorisations.
- Liaise with the GM and Management Team on environmental management (where required).

Furthermore, the Environmental Manager will be responsible for the following:

- Identifying all potential environmental emergencies for the mine and develop an Emergency Reponses Plan / Procedures.
- Testing, where practical, the response plans developed to deal with identified potential environmental emergencies.
- Investigating any environmental impacts after the occurrence of an emergency to ensure that all aspect registers and procedures are still relevant.
- Ensuring the periodical review and, if necessary, revision of the Emergency Reponses Plan / Procedure, in particular after the occurrence of accidents or emergency situations.
- Distribution of the standard procedure to all relevant Mining and Processing Managers.

6.2.4 CONTRACTORS

Contractors will be contractually required to comply with the commitments in this EMP.

The various contractors will be required to develop their own “internal management plans” and / or Method Statements (MS) related to their specific work requirements and work area(s), taking the commitments in this EMP into account, as well as any other relevant RUN Project minimum requirements, specifications, authorisations, procedures and/or permits.

RUN will conduct regular informal inspections at contractor areas. Non-compliances will be recorded in the EMS to be developed, and action plans developed in conjunction with the contractor that contravened the clause of the EMP.

Contractors will be formally audited on a regular basis in order to determine compliance with the EMP and their own MS. In the event of non-conformances, the contractor will be required to take corrective action as directed by RUN.

These formal audits will form the basis of the information to be provided in the bi-annual reports to the relevant authorities.

6.2.5 EXTERNAL SPECIALISTS

RUN may appoint external environmental specialists, as and when required, to assist with the implementation of certain commitments made in the various management plans.

An independent auditor may also assess compliance against the EMP on an annual basis.

6.2.6 STEERING COMMITTEE

Consideration of a 'Steering Committee' shall be established during the construction phase of the Project.

The Steering Committee may consist of, amongst others, RUN (to coordinate and facilitate); representatives from the MEFT: Directorate of Wildlife and National Parks and relevant Ecological and / or environmental specialist(s). The outcome of further studies and the adoptive management approach (see section 9) would be typical points of discussion.

6.3 DEALING WITH ENVIRONMENTAL EMERGENCIES & INCIDENTS

Potential environmental emergencies will be identified by the Environmental Manager based on legal and other requirements, aspects identified and risk rating, knowledge of the mining environment and previous emergency situations.
Procedures will be developed and implemented by RUN as part of their EMS to deal with environmental emergencies and incidences. The procedures will include, amongst others, the following information:

- Who to notify.
- Steps to be taken to minimize impacts.
- Possible samples to be taken, depending on the nature of the emergency / incident.
- Reporting requirements (internal report as well as possible external reporting).
- Clean-up and remedial actions.

6.4 AUDITING COMPLIANCE OF THE EMP

The commitments contained in this EMP (once the ECC and the ML have been obtained from MEFT and MME respectively) as well as conditions in the ECC and other environmental permits, will be RUN's contractual agreement with the Namibian authorities for sound environmental management. All employees, contractors and sub-contractors and any visitors to site will be expected to comply with the commitments contained herein.

6.4.1 INTERNAL AUDITS AND INSPECTIONS

The Environmental Manager will ensure that internal management audits against the commitments in the EMP are undertaken regularly. The audit findings will be documented for both record keeping purposes and for informing continual improvement.

The Environmental Manager will furthermore conduct regular inspections during construction and during mining and associated operations.

6.4.2 EXTERNAL AUDITS

Audits by an independent auditor will be conducted to assess compliance against the EMP, as required.

6.5 REPORTING / SUBMISSION OF INFORMATION

As a minimum, the following documents will be submitted to the relevant authorities on an ongoing basis:

- The bi-annual (environmental performance) report required by the MEFT.
- Reporting requirements stipulated in the conditions of the ECC and environmental licences and/or permits.

6.6 TRAINING, AWARENESS AND COMPETENCY

Environmental induction training will be provided to all persons undertaking work at the Project (to be incorporated into normal induction training) including permanent workers, contractors, visitors and consultants.

This will ensure that all persons at the Project site are:

- Aware of the environmental sensitivities of the Project site.
- Informed of the risks of the Project and the causes thereof.
- Aware of the objectives and management and mitigation measures of the EMP.
- Understand the consequences of their individual actions.

The EMS will also identify, plan, monitor and record training needs for personnel whose work may have a significant adverse impact upon the environment. Employees, contractors and consultants at all levels will be made aware of the potential impacts of their activities, and the roles and responsibilities in achieving conformance with the EMP, internal policy and procedures.

Personnel with responsibilities in specific environmental practices will be adequately trained to ensure effective implementation of the EMP and other EMS procedures for which they have responsibilities. This training will include awareness and competency with respect to the following:

- General awareness relating to environmental and social impacts that could potentially arise from Tumas Project activities.
- Legal requirements in relation to environmental performance.
- Necessity of conforming to the requirements of the ECC, other permits and the EMP, including reporting requirements (i.e. incident reporting).
- Activity-specific training (i.e. waste management practices).
- Roles and responsibilities to achieve compliance, including change management and emergency response.

Training will take cognisance of the level of education, designation and language preferences of the personnel.

6.7 STAKEHOLDER CONSULTATION / COMMUNICATION MANAGEMENT PLAN

It is important that channels of communication are maintained over the life of the Project for relevant stakeholders. The following management measures are therefore relevant throughout the duration of the Project (i.e. all project development phases).

6.7.1 MANAGEMENT MEASURES

Issue 1: Understanding who the stakeholders are

Action 1: Maintain and update the stakeholder (I&AP) register. Ensure that all relevant stakeholder groups are included.

Issue 2: Liaison with I&AP in all phases of the life of mine

Action 1: Devise and implement a stakeholder communication and engagement strategy.

Action 2: As far as is reasonable, inform identified stakeholders about the mine's activities. Broadly disseminate information regarding the number and type of jobs available to try to limit inward migration.

Action 3: Use appropriate communication channels to consult with and disseminate information to the public. Communication channels could include: open days, with particular attention being paid to the accessibility of venues, corporate newsletters for both employees and the public, national and local newspapers, television, radio and the internet, and an annual sustainable development report.

Issue 3: Managing perceptions, issues and/or complaints

Action 1: Develop and implement a concerns/complaints (grievance) process for stakeholders and publicise the channels through which issues can be submitted to RUN:

- Document all complaints in an external communications register.
- Respond promptly to acknowledge receipt of complaints and comments.
- Investigate and report on findings of issue to the complainant.
- Keep complete auditable records of complaints, responses and actions taken.
- Introduce an independent mediator if the grievance/complaint cannot be resolved reasonably between RUN and the affected party.

Action 2: Develop and actively provide educational material to public servants, the public and schools regarding the risks and benefits of uranium and nuclear power.

Issue 4: Safety of third parties

Action 1: Through appropriate communication and inductions, provide information to educate third parties about the dangers associated with hazardous excavations, activities and infrastructure.

6.7.2 MONITORING AND REPORTING

- Monitor changes in attitude toward mining in the communities of interest.
- Develop audit criteria for monitoring the performance of mine stakeholder engagement and communication strategies, as well as relations between the Company and its stakeholders.
- Report as required to MEFT (see section 6.5).
- In the event of an emergency incident, report to the relevant authorities.

6.8 SAFETY AND SECURITY (THIRD PARTIES) MANAGEMENT PLAN

It is essential that safety and security measures are defined and implemented to adequately protect the mine site from being accessed by unauthorised people. An emergency response plan for incidents is also essential. The management and mitigation measures below are relevant throughout the duration of the project (i.e. all project development phases).

Note that a separate Occupational Health and Safety (OHS) Plan shall be developed for the mining activities which does not form part of this EMP.

6.8.1 MANAGEMENT AND MITIGATION MEASURES

Issue 1: Site access

Action 1: Warning signs will be erected and maintained at the entrance to the Mine (at the C28 road) as well as at construction sites (during the construction phase).

Action 2: Security control will be in place at the access point to prevent uncontrolled vehicle and pedestrian access.

Action 3: Security and safety personnel will manage access to the site.

Action 4: Any persons entering the mine area will be required to undergo a formal induction.

Action 5: Unannounced (without an appointment and/or invitation) visitors will be denied access.

Issue 2: Safety risks

Action 1: Operate an alcohol and drug free site and include random testing of all people on entry to site, at the beginning of shifts and at any time on duty. Conduct random tests also at the construction camp.

Action 2: Ensure all security personnel are well vetted and trained.

Action 3: The permanent above ground facilities will be designed, constructed and operated in a manner that stability is a priority, flood protection is provided and the risk of failure is limited to acceptable levels.

Action 4: Third parties and/or animals found in potentially risky situations will be managed by the relevant mine personnel and people who enter without authority will be reported to police.

Issue 3: Emergency

Action 1: Develop and implement an emergency response plan relating to third parties' safety (i.e. hazardous excavations that can cause injury, etc.).

6.9 SOLID & LIQUID WASTE (INCLUDING SEWAGE) MANAGEMENT

This section relates to non-mineralised waste and the management and mitigation measures below are relevant throughout the duration of the Project (i.e. all project development phases). The measures relate to both radioactive contaminated waste as well as non-radioactive contaminated waste.

6.9.1 MANAGEMENT AND MITIGATION MEASURES

Issue 1: General

Action 1: The waste management procedure for the Tumas Project (including the mining, processing and associated activities, as well as the construction of the water pipeline and powerline) must cover the recycling, re-use, storage, handling, transportation and disposal of waste.

Action 2: Waste will be temporarily handled, sorted and stored on site before:

- Either being removed for recycling by suppliers, re-used by scrap dealers or final disposal at permitted waste disposal facilities – relating to non-radioactive contaminated waste.
- Final disposal onsite into TSF – relating to radioactive contaminated waste.

Action 3: On site facilities will be provided at a "waste transition yard" (WTY) near the proposed salvage yard for sorting and temporary storage of waste prior to removal and disposal.

Action 4: A registered Waste Management Company will be contracted to remove all non-radioactive contaminated waste (both hazardous and non-hazardous) from the mine.

Action 5: The following waste management hierarchy will be implemented:

- Waste minimisation.
- Re-use and recover waste.
- Treat waste if required.
- Disposal in suitably permitted and managed landfills offsite (i.e. non-radioactive contaminated) or disposal onsite (i.e. radioactive contaminated).

Action 6: Waste will be transported off site to the appropriate disposal facilities by an approved waste contractor.

Action 7: Vehicles transporting hazardous waste will be clearly marked.

Action 8: The integrity of transport packaging and containers will be appropriate to the type of waste being transported.

Action 9: Loading and unloading procedures will be followed to avoid spillage.

Action 10: No waste shall be burnt on site (with the exception of explosives packaging).

Action 11: Empty reagents bags (non-radioactive contaminated) will be returned to the supplier, where possible.

Action 12: No litter must be left at the development site(s) as this would stimulate illegal dumping activities.

Action 13: Keep complaints register and document all complaints from the public.

<u>Issue 2: Collection, storage and disposal of non-hazardous waste (non-radioactive contaminated)</u>

Action 1: Designated waste collection points will be established on site. Care will be taken to ensure that there will be sufficient collection points with adequate capacity. Receptacles must have lids to prevent wind borne litter or scavenging by animals.

Action 2: Recyclable waste will be sent to a reputable recycling company. The remainder of the waste will be disposed at a licenced landfill site off site.

Action 3: Washed/neutralised drums are to be separated into salvageable and non-salvageable groups.

Action 4: Non salvageable drums (and drums that contained hazardous materials) should be cleaned, flattened and sold as scrap or disposed of as above.

Action 5: Non-recyclable waste will be collected and taken to an off-site waste facility.

Action 6: Scrap metal and wood (from packaging) should be sold to a reputable company.

Action 7: Consider using a press/compactor on site to press relevant waste material before storage and disposal.

Action 8: Avoid foamalite packaging for food container on site.

Action 9: The WTY to be established on site must have the required equipment to allow sorting and storage of waste. This will include: the following::

- Temporary site office.
- Toilet facilities.
- Sufficient skip loaders.
- A press/compactor for scrap metal.
- Sufficient skips for waste.
- Used oil and hydraulic fluid storage area within a bunded area with an oil sump.
- A sorting area.
- Recyclable collection area
- The entire WTY will be fenced.
- Each waste storage area and skip will be clearly marked to be used for different waste types.

Action 10: Skips in relevant work areas will be provided for different waste types.

Action 11: Inert waste such as building rubble will be disposed of to a designated area in the WRD.

Issue 3: Collection, storage and disposal of hazardous waste (non-radioactive contaminated)

Action 1: Designated waste collection points will be established on site for hazardous waste. Care will be taken to ensure that there will be sufficient collection points with adequate capacity.

Action 2: Hazardous waste will be disposed of at a permitted hazardous waste disposal site.

Action 3: The yard will have a dedicated area for used oil/chemicals storage that will include an impermeable concrete slab, bunding, an oil trap and sump.

Action 4: Used oil will be sent to a reputable recycling company for recycling.

Action 5: Materials contaminated with oils and greases will be disposed of at a permitted hazardous waste disposal site.

Action 6: All explosive bags are to be collected together and safely burnt at the dedicated site (i.e. magazine site) according to permit conditions and procedures, where applicable.

Action 7: Ensure that hazardous waste is kept in impermeable bunded areas until it can be removed from site to the hazardous waste facility. Also, ensure rainwater cannot mix with hazardous waste inside the waste receptacles / storage areas.

Action 8: Store fluorescent tubes (if any) in a special labelled steel drum.

Action 9: Ensure that waste storage areas and/or containers meet the risk needs for that specific waste (e.g. impervious floor, bunded areas with drainage/containment systems, lids to prevent light material from blowing away or sealed containers for hazardous material).

Action 10: Used oil, grease, chemicals and other hazardous substance containers will be stored in drums in bunded areas at key points in work areas. The bunds will be able to accommodate 110 % of the container contents and include a sump and oil trap.

Issue 4: Collection, storage and disposal of radioactive contaminated waste

Action 1: Develop a Radiation Waste Management Plan.

Action 2: Radioactive contaminated waste will be stored in a suitable manner and disposed of regularly into the TSF.

Action 3: Recyclable waste will be decontaminated (high pressure washing) if reasonably practical to do so and will be then sent to a reputable recycling company.

Issue 5: Medical waste

Action 1: Dispose the medical waste offsite at an approved medical waste facility.

Action 2: Medical waste will be stored in suitable containers at the clinic.

Action 3: A Waste Management Contractor will remove this waste regularly to the disposal site.

Issue 6: Sewage management

Action 1: An onsite biotreatment plant to be installed on site which will process sewage waste from construction (partial) and operations ablutions. The treatment plant to be installed during early stages of the Project.

Action 2: Portable toilets with associated above ground storage tanks to be used for the early works program whilst the permanent facility is being construction, as well as dedicated locations along the pipeline and powerline during construction.

Action 3: Portable toilets' septic tanks to be emptied on a regular basis and the effluent disposed in the permanent onsite biotreatment plant or at a licenced facility in Swakopmund or Walvis Bay.

Action 4: Treated effluent water from the treatment plants may be reused in the process plant or for dust suppression, depending on permission from MAWLR. Ongoing monitoring of the treated effluent will be required to ensure compliance with the permit conditions.

Action 5: A suitable number of toilet facilities, either portable or permanent and based on the number of people at site, will be provided at all times.

Action 6: Portable latrines should be limited to the construction area(s) only.

Action 7 All personnel will be required to defecate/urinate in approved toilet facilities at all times.

Action 8: RUN will ensure compliance throughout.

Action 9: Any spillages should be adequately rehabilitated.

Action 10: Construct the waste treatment plant away from groundwater sources and production boreholes. Take into account local groundwater conditions and construct the facility with appropriate risk assessment.

Action 11: Obtain relevant effluent discharge permit which outline the best practice guidelines for waste- water treatment plants and comply to the conditions set therein to ensure compliance to the Water regulatory framework.

Action 12: Groundwater monitoring boreholes downgradient of waste treatment facility to be analysed for relevant biological parameters.

Action 13: The treatment plant to be constructed to acceptable engineering standards (preventing possible spillage into the environment) in a dedicated area.

6.9.2 MONITORING / PLANNING / FURTHER INVESTIGATION / REPORTING

- RUN to develop a detailed waste management strategy in liaison with the Municipality of Swakopmund and Walvis |Bay as well as the Uranium Institute (i.e. other Uranium mines in the region).
- Keep records of waste transport and disposal.
- Keep safe disposal certificates of waste.
- Regular inspections of non-mineralised waste handling and management facilities will be undertaken to ensure that the waste management procedures are being implemented. The volume and type of non-mineralised waste, and the disposal destination, will be monitored, recorded and reported as required. The results will be reported as part of the bi-annual report.

6.10 SPILL PREVENTION AND MANAGEMENT

This section relates to chemical and hydrocarbon related spillages and the management and mitigation measures below are relevant throughout the duration of the Project (i.e. all project development phases), where relevant.

6.10.1 MANAGEMENT AND MITIGATION MEASURES

Issue 1: Handling storage, transport and use of hazardous substances (i.e. hydrocarbons, chemicals, process liquors, etc.)

Action 1: All legal health and safety requirements will be implemented when transporting hazardous substances to site.

Action 2: Transport companies will comply with all legal requirements for the handling and transport of hazardous substances.

Action 3: Storage facilities/tanks will comply with all relevant health and safety requirements applicable for Namibia. Furthermore, fuel and other petrochemicals will be stored in receptacles that comply with SANS100-1:2003 (SABS089-1:2003).

Action 4: Ensure adequate signage at chemical and hydrocarbon storage areas.

Action 5: All hazardous substances used on site will have readily available material safety datasheets (MSDS). MSDS for all chemicals and hydrocarbons will be displayed in close proximity to the area of storage.

Action 7: Chemical hazards training will be an integral part of safety training and induction, where appropriate.

Action 8: Procedures will be developed for the use and handling of all dangerous chemicals.

Action 9: Correct personal protective equipment will be supplied for the relevant work.

Action 10: All hazardous chemicals and hydrocarbons will be stored in lined and bunded areas and handled to prevent dispersion to the environment. Bunded areas will have capacity for 110% of the largest container stored. Appropriate containers will be used for storage and transport of hazardous substances.

Action 11: Hazardous chemicals (including those used for cleaning) and hydrocarbon will not be released into the environment or sewage treatment system. These materials will be contained and disposed of as hazardous waste.

Issue 2: Avoid/minimise environmental impact from spills

Action 1: Major spillage incidents will be handled in accordance with the mine emergency response procedure. Any significant spills (i.e. >200 litres) will be reported to MAWLR (DWA) within 24 hrs and corrective action taken.

Action 2: Induct all relevant employees and contractors in the mine's spillage management procedure.

Action 3: Personnel dealing with hazardous substances will be appropriately trained.

Action 4: Regular inspection will be carried out on areas where hazardous substances are stored or handled.

Action 5: Hazardous chemicals and hydrocarbon spills will be regarded as an environmental incident and reported through the incident reporting system.

Action 6: All spills of hazardous chemicals or hydrocarbons (oil, grease, diesel, petrol, etc.) will be contained with the use of suitable absorbent materials.

Action 7: All soils that have become contaminated with oils, fuels and lubricants will be bio-remediated or removed and managed as hazardous waste. Develop a bio-remediation procedure and implement.

Action 8: Ensure appropriate inspections are conducted to ensure early detection of spills. The integrity of containers and bunds will be monitored regularly to ensure that no seepage escapes.

Issue 3:General requirements for bunding, oil and fat traps, silt traps and wash bays

Action 1: Bunding:

- All bunded areas must have a capacity of 110 % of the capacity of product that will be stored in the bunded area.
- Bund floors and walls must be designed to be impermeable.
- Bunded areas can be equipped with an outlet pipe but a manual stop valve must be installed.
- Outlet pipes must empty into an oil trap (refer to section below for minimum requirements and maintenance of soil and fat traps).
- Windblown dust and sand collecting in bund areas must be removed.
- No vehicles or machinery that can compromise the integrity of bund walls may be used to clean out bunded areas.

- Once all sand is removed from bunded areas, a hydrocarbon washing solution can be used to wash off all fuel and oil spills.
- Once the hydrocarbon washing solution is applied, water can be used to wash down the hydrocarbon spills through the outlet pipe.
- Once the washing is complete, ensure that the outlet valve is closed.

Action 2: Oil, fat and silt traps:

- Oil traps must be constructed down gradient from any activity which might possibly produce an effluent containing hydrocarbons.
- If an oil trap and silt trap is required within the same system, the silt trap must always be constructed up-gradient of the oil trap to prevent sedimentation within the oil trap.
- The standard oil trap design and specifications as used by petrochemical companies must be employed.
- A dedicated oil trap pump must be provided for the cleaning of oil traps.
- Oil and fat traps associated with an onsite kitchen area, must be cleaned on a monthly basis or more frequently as the specific situation may dictate.
- Silt traps must be constructed down gradient from any activity which might possibly produce an effluent with suspended material.

Action 3: Wash bays:

- Wash bays may not be positioned in a low-lying area.
- Wash bays must be appropriately designed to facilitate the washing of mobile cranes, cement trucks, and heavy-duty vehicles.
- Wash bays must be constructed with re-enforced concrete to accommodate heavy vehicles.
- It is recommended that a trench covered with removable grids surround the wash bay to capture all runoff, instead of using a bund as regular traffic over a bund often results in the bund being compromised.
- A silt trap and oil trap must be constructed below any wash bay to capture any sediments and hydrocarbons (refer to sections above for the minimum requirements and maintenance of silt and oil and fat traps).
- Only bio-degradable detergents to be used where practical to do so.

6.11 WILDLIFE INTERACTIONS

This section relates to interactions with wildlife during all project development phases. The management and mitigation measures below are therefore relevant throughout the duration of the Project (i.e. all project development phases).

6.11.1 MANAGEMENT AND MITIGATION MEASURES

Issue 1: To ensure that wildlife and plants are not harmed or killed

Action 1: The collection, harvesting, trapping and killing of wildlife or plants will be prohibited.

Action 2: If wildlife becomes trapped by project infrastructure, is at risk of harm or poses harm to project personnel then an appropriately qualified person/MEFT will be called to remove the animal.

Action 3: Contact details of a suitably qualified wildlife vet/MEFT Park Warden will be kept on file.

7 ENVIRONMENTAL MANAGEMENT PLANS SPECIFIC THE TO THE PROPOSED TUMAS MINING, PROCESSING AND ASSOCIATED ACTIVITIES

The management plans (MP) listed in

Table 6 are relevant (specifically) only to the Tumas Project mining, processing and associated activities (and not the associated powerline and water pipeline). The management plans follow in the subsequent sections. Separate EMPs were developed for each of the powerline and water pipeline specific MPs.

The following abbreviations are used in the sections below for the various project development phases:

- **C** = Construction phase (Note: the construction phase also takes the requirements for further design work during the detail design phase into consideration).
- **O** = Operations phase.
- **D** = Decommissioning.
- **CL** = Closure.

TABLE 6: VARIOUS MANAGEMENT PLANS RELEVANT TO THE TUMAS MINING, PROCESSING AND ASSOCIATED ACTIVITIES

Number	Management plan (MP)
7.1	Biodiversity MP
7.2	Surface Water MP
7.3	Groundwater MP
7.4	Air Quality MP
7.5	Radiological MP
7.6	Noise MP
7.7	Archaeology MP
7.8	Visual MP
7.9	Socio-Economic MP

7.1 BIODIVERSITY MANAGEMENT PLAN

7.1.1 FLORA MANAGEMENT PLAN

Objective:

The objective of the measures is to prevent, as far as is possible, the significant loss of vegetation and related functionality through physical disturbance, reductions in water flows and general disturbance.

Management and Mitigation measures:

Action nr	Management, mitigation and monitoring requirements	Project phase
Issue 1: General Management and mitigation measures		
Action 1	The following relate to protection and restoration of vegetation:	C / O / D

Action nr	Management, mitigation and monitoring requirements	Project phase
	• Use map of environmentally sensitive areas to guide all planning decisions. • Protect environmentally sensitive areas from inadvertent disturbance. • Maintain ecosystem function by retaining water flow (after rain events). • Develop site-specific rehabilitation methods. • Rehabilitate disturbed areas progressively (as soon as possible) during the operating phase of the Project. • Prevent and control spread of invasive alien plants. • Implement measures to limit resource use (especially water).	
Action 2	The following relate to limiting the Project footprint: • Use mobile structures (i.e. containers) as far as possible. • Limit clearance and disturbance to what is absolutely necessary. • Minimise and clearly demarcate track and road network. • Clearly demarcate areas where machinery and vehicles move or park.	C / O / D
Action 3	The following relate to preventing pollution: • Use bio-degradable products where available and practicable. • Prevent pollution of soil and water. Refer to sections 6.9, 6.10, 7.2, 7.3 and 7.4. • Implement dust control measures. • Favour renewable energy over conventional energy sources, as far as practical.	C / O / D
Action 4	Refer to the Flora Specialist Study for the Tumas Project for management guidelines relating to planning, construction, operations and rehabilitation.	ALL
Issue 2: Loss of vegetation and associated biota due to mine development and associated infrastructure within the project area and accessary works area		
Action 1	Minimise ground disturbance.	C / O / D
Action 2	Protect environmentally sensitive areas and avoid these for the position of accessory works infrastructure	C / O / D
Action 3	Backfill excavated areas continuously.	O
Action 4	Develop a plan for restoring Salsola hummocks. Rehabilitate and restore impacted Salsola hummocks in critical areas.	O / D / CL
Action 5	Monitor dust by positioning dust bucket near marble mountain and ridge and monitor effect of dust on vegetation.	C / O
Action 6	Enhance dust control on access and machinery movement areas.	C / O / D
Action 7	Avoid the marble mountains and ridge for position of infrastructure.	C / O
Action 8	Maintain flow of Tumas River and main tributaries by creating diversions around blockages created by infrastructure, dumps and pit.	ALL
Action 9	Survey for protected species in areas ear-marked for position of infrastructure in the Project area, including the service corridor and accessary works area.	C
Action 10	Avoid clearing protected species in the service corridor. If protected species cannot be avoided, transplant into suitable habitat and monitor survival.	C / O
Action 11	Rehabilitate progressively.	C / O
Action 12	Obtain permit for clearing of protected trees that cannot be avoided.	C
Issue 3: Loss of individuals of species with special conservation status (protected, red-listed, Cites or endemic)		
Action 1	Refer to actions under “Issue 2”.	
Issue 4: Loss of vegetation and associated biota due to the construction work force		
Action 1	Develop special environmental guidelines to control the impacts of a construction camp on site. These special guidelines must include measures to: • Prohibit firewood collecting and plant harvesting. • Prevent introduction of exotics.	C

Action nr	Management, mitigation and monitoring requirements	Project phase
	• Govern sanitation. • Control other pollution.	
Action 2	Employ sufficient environmental staff during the construction phase.	C
Action 3	Strictly enforce NNNP rules.	C
Action 4	Develop and implement an Environmental Code of Conduct.	C
Issue 5: Effect of dust on vegetation		
Action 1	Use dust suppression measures at dust sources (see Section 7.4).	C / O / D
Action 2	Monitor dust impact on vegetation.	C / O
Issue 6: Introduction of invasive alien plants		
Action 1	Implement appropriate weed and seed clearance inspections. Bring no material from alien-infested sites on site; i.e. check trucks or sites (where possible) for invasive aliens before loading; if invasive aliens cannot be avoided, treat material with relevant herbicide and spray tyres and vehicle underbody.	C / O / D
Action 2	Monitor sites where additional water could potentially lead to the establishment of invasive alien plants.	C / O / D
Action 3	Eradicate emerging invasive alien plants in the Project area.	C / O / D
Issue 7: Loss of Salsola nollothensis hummocks in Project area		
Action 1	Avoid clearing or damaging Salsola hummocks wherever possible.	C / O
Action 2	Refer to actions under “Issue 2”.	
Issue 8: Change of habitat		
Action 1	Maintain surface drainage channels for water flow during operation.	ALL
Action 2	Monitor the effect of pit development on down-stream vegetation and vegetation in ecological sensitive areas (i.e. Area A and B - see section 7.1.3).	C / O
Action 3	Re-establish natural flow conditions as far as possible upon closure.	D / CL
Issue 9: Loss of environmentally sensitive areas		
Action 1	Protect remaining sensitive areas by clearly demarcating a confined work and machinery-movement area.	C / O
Action 2	Avoid sensitive areas for position of accessory works infrastructure.	C / O
Action 3	Survey for protected species in areas ear-marked for accessory works infrastructure.	C / O
Action 4	Map lichen-dominated areas in more detail, use to guide planning of accessory infrastructure positions and demarcate where near proposed developments	C
Action 5	Obtain permit for clearing of protected trees that cannot be avoided.	C
Action 6	Strictly control vehicle and machinery movement in the area where lichens and individual trees and nara plants occur by demarcation of all areas where movements are necessary (access, lay-down, parking) and rigorous enforcement.	C / O / D
Action 7	Avoid the marble and dolerite ridges for position of accessory works infrastructure.	C / O
Action 8	Protect remaining sensitive areas and avoid these for the position of accessory works infrastructure.	C / O
Action 9	Monitor dust by positioning dust bucket in lichen-dominated area and near marble ridge.	C / O
Action 10	Enhance dust control on access and machinery movement areas.	C / O
Action 11	Monitor effect of dust on sensitive lichen area.	C / O
Action 12	If areas with lichens are directly affected, implement special rehabilitation methods such as salvaging lichens and biotic crust and re-applying these on rehabilitated areas.	C / O

7.1.2 FAUNA MANAGEMENT PLAN

Objective:

To prevent, as far as is possible, the unacceptable loss of vertebrate fauna and related functionality through physical disturbance, reductions in water flows and general disturbance. Also, to ensure the integrity of the terrestrial ecology.

Management and Mitigation measures:

Action nr	Management, mitigation and monitoring requirements	Project phase
Issue 1: Impacts on vertebrate fauna as a result of the development and activities associated with the		
Action 1	Identify areas to be developed and avoid all other areas – i.e. limit all activities to the demarcated mining areas only.	C
Action 2	Avoid where possible the areas identified as important habitats/areas/features (see section 6.7 of the EIA Report and sections 5 and 6 of the Fauna Specialist Report).	C
Action 3	Identify the main access route – i.e. avoid lappet-faced vulture nesting tree sites (maintain a buffer of approximately 2 km around each site).	C
Action 4	Identify all tracks and extraction routes – i.e. clear the least number of tracks.	C
Action 5	Identify potential plant area – i.e. avoid important habitats/areas/features.	C
Action 6	Plan mining activities so that when operations are completed in an area that is no longer needed, rehabilitation may begin promptly.	C / O
Action 7	Identify area(s) where topsoil may be stored for rehabilitation purposes – i.e. marginal areas such as barren gravel plains and avoid important habitats/areas/features.	C / O
Action 8	Identify areas where waste rock/overburden may be stored for backfilling/rehabilitation purposes – i.e. marginal areas such as barren gravel plains and avoid important habitats/areas/features.	C / O
Action 9	Establish a nursery area where plants and seeds removed from the mining site can be stored and maintained for future rehabilitation purposes.	C / O
Action 10	Liaise with MEFT staff and/or negotiate with nurseries in Swakopmund/Walvis Bay and elsewhere to advise/train staff to run nursery efficiently.	C / O
Action 11	Draft a Rehabilitation Plan for use during progressive rehabilitation.	O / D
Issue 2: Integrity of the terrestrial fauna		
Action 1	Avoid disturbance to all areas identified as important habitats/areas/features as far as possible (see section 6.7 of the EIA Report and sections 5 and 6 of the Fauna Specialist Report).	C / O
Action 2	Planning of mining activities take cognisance of the sensitive habitats/areas/features and maintain wildlife corridors (e.g. foraging areas, especially vegetated drainage lines) and the overall interconnectivity of various habitats.	O
Action 3	The proposed plant area should not be placed within vegetated drainage lines, but rather on barren gravel plains.	C
Action 4	The access route must be upgraded to a sealed (i.e. tarmac / bitumen covered (or similar)) road to minimise dust pollution. Strictly regulate vehicle speeds and limit night time vehicle activity along the access road as far as possible. Regular speed checks must also be carried out along the access road.	C
Action 5	Maintain track discipline – i.e. speed limits aligned with the Park Rules and disallow off-road driving.	A
Action 6	Ensure erosion control on all tracks.	C / O

Action nr	Management, mitigation and monitoring requirements	Project phase
Action 7	The harming, maiming, hunting or poaching of wildlife in any form or manner shall be prohibited.	A
Action 8	Prevent the removal or destruction of large tree species not associated with mining activities – e.g. *Acacia erioloba* / *Faidherbia albida* / *Tamarixusneoides* specimens used by raptors and vultures.	C /O
Action 9	Remove (i.e. conduct a sweep of the area) all unique vertebrate species – e.g. Namaqua chameleon, etc. – to a similar habitat in the general area not envisaged to be disturbed in future.	C
Action 10	Backfill pit site(s); smooth pit site(s); use waste rock as barrier around deeper pit site(s); fence off deeper pit site(s).	O / D
Action 11	Do not block the Tumas River channel with waste rock, etc, or where unavoidable, provide diversion.	O / D
Action 12	Educate and inform contractors and staff on important habitats/areas/features/species to avoid and the consequences of illegal collection and/or killing/harming of such species. Liaise with MEFT to provide this service as the area is within the Namib-Naukluft Park.	A
Action 13	Use focused lighting on site or else this could influence and/or affect various nocturnal species – e.g. especially migrating Palaearctic birds, bats, owls, etc. – and contribute to "light pollution".	O
Action 14	Remove wildlife by trained / experienced reptile handlers if safe to do so – e.g. reptiles such as chameleons, snakes, etc. that may move into the mine and plant area – and relocate to similar habitat elsewhere using suitably trained staff or contractors.	O
Action 15	Prevent the areas from becoming illegal dumping sites as this would adversely affect future rehabilitation and result in litter; pollution and potential problem animal (e.g. black-backed jackal; crows) issues.	O
Action 16	Only conduct mining activities within approved mining areas in order to limit the area of disturbance.	O
Action 17	When possible, backfill the mine out pit(s) after ore has been extracted or as soon as practicable and smooth pits to avoid a pitfall trap scenario.	O / D
Action 18	Monitor (and document) all mortalities related to the Project activities and infrastructure.	O
Action 19	Remove, or dispose of in a suitable manner, all equipment, waste, temporary structures, etc. from mining area(s).	D
Action 20	Fill and/or reshape all disturbed areas to their original contours, or to blend in with the surrounding landscape. .	D
Action 21	Cover disturbed areas with previously collected topsoil and spread evenly	D
Action 22	Where practicable, replant previously removed indigenous vegetation in disturbed areas and water reintroduced vegetation for up to three months to enhance survival rates and supplement with additional reintroductions if required.	D
Action 23	No invasive alien plant species to be introduced to the area.	D
Action 24	Monitor the success of reintroductions and overall rehabilitation every six months for up to two years after rehabilitation.	D

7.1.3 ECOLOGICAL MANAGEMENT PLAN (INCLUDING INVERTEBRATES)

Objective:

The objective of the measures is to prevent or minimise, as far as is possible, the unacceptable ecological impacts relating to the loss of key resource area, key-stone species and high-value habitat; disruption of animal movement, gene flow and migratory patterns, fragmentation of populations using the Tumas valley; affects riparian ecosystems; and effects on invertebrates from light pollution.

Management and Mitigation measures:

Action nr	Management, mitigation and monitoring requirements	Project phase
Issue 1: Loss of key resource area, key-stone species and high-value habitat		
Action 1	Mining of pits overlapping with Areas A and B (and associated activities) areas is not to be undertaken until further research and monitoring have addressed current knowledge gaps allowing for a reassessment of the sensitivity status and spatial boundaries of Areas A and B in consultation with key stakeholders. Specific management measures to be defined and the EMP revised accordingly and submitted to the regulatory authorities. Refer to section 9 for further information regarding Areas A and B.	O
Action 2	Other demarcated high biomass area in the Tumas River system to be treated as very sensitive and hydrological processes managed to maintain flood water supplies and groundwater availability in these areas. Maintain surface flow in drainage lines as far as is practicable. Minimise the number of roads crossing the river or its tributaries these must not block or slow flood water.	O / D
Action 3	Limit destruction or damage to trees or shrubs. These plants are particularly important for the ecology of this desert environment.	C / O
Action 4	Restore the natural drainage system to its former stream bed and river bank morphology after mining, as far as practicable.	O / D
Action 5	Limit disturbances (e.g. human presence, vehicles, machinery) within the active flow channels of the Tumas River and its tributaries as far as is practicable, especially where denser vegetation or hummocks occur. Where the channel needs to be diverted, minimize such disturbance and limit disturbance of dense perennial vegetation during its construction.	C / O
Issue 2: Disruption of animal movement, gene flow and migratory patterns, fragmentation of populations using the Tumas Drainage		
Action 1	Minimize the footprint of disturbed areas as far as possible.	A
Action 2	Keep levels of disturbances such as noise, light and dust low. For example, enforce speed limits for vehicles.	A
Action 3	Limit disturbances (driving, human presence, machinery, lights) in or nearby the active stream bed (flow channel) of the Tumas River system, including tributary streams and riverbanks where practicable.	O
Action 4	Place service roads that run parallel to the river, as well as any other infrastructures, away from the river habitat and relatively dense vegetation associated with the river system.	O
Action 5	Minimize roads and disturbances on the southern side of the river to allow larger animals space to negotiate around disturbances.	C / O
Issues 3: Preservation of key resource areas		
Action 1	See issue 1.	
Action 2	Restrict perturbance of water table level and water quality in Area A and Area B . Further investigation is needed to establish safe thresholds of groundwater level and quality fluctuations.	C / O
Action 3	The other identified high biomass areas (and *Salsola* hummock areas) should be treated as very sensitive. These patches act as 'stepping stones' for animal dispersal and movements in the Tumas River system, as well as providing key resources during critical times.	C / O
Action 4	Water pumped from mining pits or boreholes should not be released directly on plants, as it may be toxic for plants in their undiluted form (even salt-tolerant species).	C / O
Issue 4: Maintaining an unrestricted channel for floodwater in the Tumas River system, including its tributaries		
Action 1	Refer to Surface Water Management Plan.	

Action nr	Management, mitigation and monitoring requirements	Project phase
Action 2	Flood water in the active flow channel of the Tumas River and its tributaries should not be restricted.	ALL
Action 3	Where the channel is diverted, the longitudinal gradient of the flow channel should remain the same as the original gradient and the channel width should allow for the volume of exceptional flood events, as far as possible.	C / O
Action 4	Where roads cross the river or mayor drainage lines, provision should be made to maintain flow in the drainage lines.	C / O
Action 5	Restore the natural drainage system to its former stream bed and river bank morphology as far as is reasonably practicable.	O / D / CL
Issue 5: Backfilling mined pits with unsuitable and polluted substrates affects riparian ecosystems		
Action 1	Strip the top (e.g. ~2 m) alluvial material in drainage areas to be mined and store these separately.	O / D / CL
Action 2	Backfill mining pits according to the mine plan and TSF design, with compatible materials and finally cover with the stored alluvial material.	O / D / CL
Action 3	Prevent pollution of any water source during the rehabilitation process.	O / D / CL
Action 4	Only backfill with tailings and waste rock material where it will be safe for the environment to do so. Ensure that the potentially hazardous material is placed below the effective root depth of plants expected to grow in the backfilled area. Effective rooting depths can be established for sidewall profiles in mining pits	O / D / CL
Issue 6: Light Pollution		
Action 1	Refer to Visual Management Plan – “Issue: Light Pollution”	C / O / D
Action 2	Artificial light should be minimized in any sensitive or high-value areas of the study area (see sensitivity maps for vertebrates and invertebrates.	C / O / D
Action 3	For phosphor-converted amber LED lights, the amount of blue light (λ < 500 nm) should be below 5% of the total spectral power, where practicable.	C / O / D
Action 4	All exterior lights should only distribute light below the horizontal, and the upward light output ratio (ULOR) should be no more than 0.5%, where practicable.	C / O / D
Issue 7: Alien and adventive organism invasion		
Action 1	No propagation or cultivation of ornamental garden plants, vegetables, or fruit trees in the Project area.	ALL
Action 2	No pets are allowed in the Project area.	ALL
Issue 8: Impacts on invertebrates		
Action 1	With reference to ongoing monitoring, etc. focus on habitats, not species.	
Action 2	Active mining pits to be widely separated in space, as far as practicable, with prompt backfilling and rehabilitation to ensure that impacts are localised, spatially spread out and of shortest duration. Align the mining and rehabilitation plan by incorporating information from commissioned environmental research (adaptive management). See section 9.	O
Action 3	Limit the surface areas being impacted as far as possible. Specifically areas earmarked for waste rock/overburden and topsoil dumps to be kept as small as possible, i.e. consider co-disposal options of these where practicable.	C / O
Action 4	Ensure orientation / location of dumpsites are designed and constructed to maintain surface flow in drainage lines.	C / O
Action 5	Wherever practicable, low-energy lights in the yellow to red spectrum should be prioritised for external lighting.	C / O / D
Action 6	Human infrastructure and work areas provide habitat and opportunity for various species that are currently rare or absent from the area. The introduction of non-native species, particularly potential adventive and alien species, should be discouraged.	C / O

7.2 SOIL MANAGEMENT PLAN

Objectives

The objectives of the measures are to prevent pollution of soils and to minimise the loss of soil resources and related functionality through physical disturbance, erosion and compaction.

Action nr	Management, mitigation and monitoring requirements	Project phase
Issue 1: Loss of soil resources from pollution and erosion		
Action 1	Refer to section 6.10 0 spill prevention and management.	C / O / D
Action 2	Ensure that the water used for dust suppression (i.e. saline water) on roads and other surface mining areas is contained to these general areas to avoid impacts to soil and plant growth in the adjacent areas.	O
Action 3	Prevent accelerated erosion by (1) disturbing as little as possible the natural vegetation and soil surface (2) carefully planning runoff water diversions on roads and other denuded areas. Roads and clearings on inclines are most vulnerable.	C / O / D
Action 4	Minimize the total distance of the road network. Close and rehabilitate unused/unnecessary roads, vehicle tracks and abandoned clearings progressively.	C / O / D
Issue 2: Topsoil stockpiling/management		
Action 1	Limit the disturbance of soils to what is absolutely necessary and approved areas only both in terms of site clearing and in terms of ongoing project development. No off-road driving allowed.	C / O / D
Action 2	Where soils have to be disturbed the topsoil will be stripped, stored, maintained and replaced in accordance with the specifications of the RUN soil management plan.	C / O / D
Action 3	Commence rehabilitation directly after the cleared area is no longer required thus ensuring that storage of topsoil is kept as short as possible, including progressive rehabilitation of the mined out pits.	C / O / D
Action 4	Avoid dumping of topsoil in too large heaps as this could result in loss of all its biologically active properties.	C / O / D
Action 5	Monitor health of topsoil through standardised method. Indicators should be determined in dedicated trials.	C / O / D
Action 6	As part of closure planning, the designs of any permanent structures (mineralised waste facilities and berms) will take into consideration the requirements for long term erosion prevention and confirmatory monitoring.	Cl
Issue 3: Ensure that the substrate of backfilled areas mimics natural soil profiles and is suitable for plant growth		
Action 1	Backfill mining pits according to the mine plan and TSF design, with compatible materials and finally cover with the stored alluvial material. Design and implement the sizing and gradient of the reinstated channel to mimic the natural channel as much as is practical to provide similar flow regimes to prevent/minimize impacts to the downstream flora and fauna.	C / O
Action 2	Only backfill with tailings where it will be safe from leaching or washing into underground water sources or any drainage system, or can be reached by existing perennial vegetation's roots.	
Action 3	Ensure that the tailings are placed below the effective root depth of plants expected to grow in the backfilled area. An indication of rooting depth can be obtained from mining pit profiles.	
Action 4	Strip the top (e.g. 2 m) alluvial material in drainage areas to be mined and store these separately.	
Action 5	Outside drainage areas, topsoil should be collected before mining once plant rescue activities have been completed. Collect only the first 10-15cm of topsoil. When backfilling use topsoil from the same habitat it was collected.	

Action nr	Management, mitigation and monitoring requirements	Project phase
	Use best practices for storing topsoil and minimize the footprint of topsoil dumps.	
Action 6	Allowance should be made for an expected increase in flood extremes in future.	

7.3 SURFACE WATER MANAGEMENT PLAN

Objective:

The objectives of the measures are to prevent as far as possible significant reduction in water flows and related loss of biodiversity and ecosystem functionality. Efficient design of storm water measures to separate contact and non-contact storm water, allowing non-contact water to continue as downstream runoff, while containing contact water on site, for storage and possible recycling. Furthermore, to prevent pollution of surface water run-off.

Management and Mitigation measures:

Action nr	Management, mitigation and monitoring requirements	Project phase
Issue 1: General Management and mitigation measures - Reduction in clean water catchments due to mining activity footprint		
Action 1	Refer to the Biodiversity Management Plans.	
Action 2	Minimise infrastructure footprint and construction footprint	C
Action 3	Further develop a (detailed) Stormwater Management Plan, by incorporating the Conceptual Infrastructure design requirements presented in the Surface Water Specialist Report.	C / O
Action 4	Refer to Actions under Issue 2 below	
Action 5	Phasing / scheduling of earthworks should be implemented in order to minimise the footprint, at any given time, where there is the potential for erosion.	C / O
Issue 2: Surface Water Contamination		
Action 1	Refer to the Groundwater Management Plan for further requirements.	
Action 2	Adopt best practice guidelines to develop detailed storm water and runoff management plans for the processing plant area and WRDs.	
Action 3	Ensure dirty water and clean water systems are in place so that no cross contamination occurs (refer to the conceptual Stormwater Control in the EIA Report and the Surface Water Specialist Report).	C
Action 4	Design and construct conveyance, collection and storage infrastructure to effectively contain dirty water.	C
Action 5	Design and construct adequate lining systems, for the plant dirty water infrastructure to prevent seepage into the groundwater systems.	C
Action 6	Design and construct diversion infrastructure to direct clean water from clean upstream catchments to clean downstream catchments, ensuring that the natural flow regime is maintained at entry, exit and within the diversion channel.	C
Action 7	All designs of clean water systems should seek to ensure clean water system infrastructure mimics the natural flow channels as far as practically possible.	C
Action 8	Topsoil and materials from the riverbed and riparian areas to be stockpiled and conserved for use in rehabilitation.	C
Action 9	Survey all natural flow channels to ensure reinstatement at closure.	C / O / D
Action 10	Suitably line and size the plant dirty water storage facility(s) to ensure no spillage into the environment during design floods.	C
Action 11	Minimise footprint of disturbed areas (areas that will generate dirty runoff) as far as possible.	O

Action nr	Management, mitigation and monitoring requirements	Project phase
Action 12	A drainage system along the WRDs to manage for run-off will be needed. Various options should be considered. e.g. toe paddocks, settlement ponds.	O
Action 13	All water generated from the TSFs are regarded as dirty as must be collected and contained.	O
Action 14	Regularly inspect, maintain and repair all infrastructure in the dirty and clean water systems to ensure that the design intent is maintained throughout the LOM.	O
Action 15	Dust suppression measures must be taken to reduce dust pollution and it is recommended that captured stormwater be reused for this purpose whenever possible.	O
Action 16	Minimise clean runoff from entering the open pits by constructing cut-off berms and channels higher up in the catchments, to direct clean water to natural clean surface water areas. Design for minimal erosion.	O
Action 17	Progressively backfill open pits according to the mine plan and TSF plan. Mimic the natural flow conditions as far as possible.	O
Action 18	Include the surface water management infrastructure plan in the Project's Operations and Maintenance Manual to ensure continued attention.	O
Action 19	Develop an emergency response procedure to deal with an occurrence of a discharge incident that could result in the pollution of surface water resources	C / O
Issue 3: Process plant / industrial effluent		
Action 1	Prevent spillages of industrial effluent. Where spillage does occur, ensure it is properly contained and cleaned up.	O
Action 2	Design relevant tanks' bunded areas (i.e. tanks containing hazardous substances) in the process plant to contain 110% of the volume of one or the largest (in a multi tank setup) tank and that pumps and pipes are maintained in good working order.	O
Action 3	Ensure that checking for industrial effluent spills is included in the daily inspection checklist.	O
Action 4	Report spillages as per the incident management procedure and clean up spills within 24 hours of the incident occurring.	O
Action 5	In the event of industrial effluent discharge into the environment, stop the incident as soon as possible and then find the root cause.	O
Action 6	In the event of soil or water pollution, spills will be cleaned up/remediated immediately (within 24 hours) in line with spillage management procedure.	C / O / D
Action 7	Ensure that the various effluent streams (tailings decant, treated effluent dirty storm water, process effluent) are managed to prevent overflow of the return water dam.	O
Action 8	Monitor the effectiveness of the mitigation measures for damage to ensure that seepage does not occur.	O
Action 9	Ensure that storage/containment facilities have sufficient capacity to cater for the various sources of water including rainfall.	O
Action 10	Install oil separators at all wash bays to separate hydrocarbons from the water.	C / O
Action 11	Skim separator regularly and dispose of hydrocarbons as per the waste management procedure.	C / O
Action 12	Maintain pipes, drains, pumps, valves, etc. to minimise the likelihood of leaks.	O
Action 13	Recycle all process water from the process pond back into the plant as per the design specifications.	
Action 14	Ensure that all the industrial effluent is discharged into the return water dam or the TSF (slurry).	O
Action 15	All liquid hydrocarbon waste will be collected, safely stored in sealed drums on impermeable surfaces within bunded areas. These areas will be designed to the relevant design standard, including to contain 110% of the volume of one or the largest (in a multi drum setup) drum. The used hydrocarbon liquid waste will be provided to third parties for recycling.	C / O / D

Action nr	Management, mitigation and monitoring requirements	Project phase
Issue 4: Domestic Effluent		
Action 1	Refer to section 6.9 – Solid and liquid waste management.	
Action 2	Conduct regular monitoring to ensure that effluent is not being discharged into the environment.	C / O / D
Action 3	Train the sewage treatment plant (STP) operators to understand the legal requirements of WWTP operations and how to achieve compliance.	C / O / D
Action 4	Induct Employees and Contractors in the use of the spill management procedure.	C / O / D
Action 5	Ensure that portable sewerage facilities installed during the construction and decommission phases are managed until such time as they are no longer used and can be decommissioned.	C
Action 6	If the treated water is acceptable for discharge it will either be discharged to the environment or piped to the TSF. Under no circumstance will water that is not suitable for discharge be released to the environment	C / O / D
Action 7	Sewerage sludge from the STP shall be removed by the sewerage services contractor for disposal at the nearest approved facility.	C / O / D
Action 8	Apply to DWA for the STP and a Waste Water Discharge permit. Conduct regular inspections and audits relating to the STP activities and ensure compliance to conditions of such possible permits issued by DWA (i.e. monitoring, etc.), where required.	C
Action 9	Operate the STP according to the operations manual to ensure optimum performance.	C / O / D
Issue 5: Spills (chemicals, hydrocarbons, etc.)		
Task 1	Refer to section 6.10 – spill prevention and management.	
Issue 6: Planning for closure		
Action 1	Phase / schedule and implemented earthworks in order to minimise the footprint that has the potential for erosion at any given time.	D / Cl
Action 2	In the case of linear earthworks, phasing of working areas and progressive rehabilitation will be necessary to minimise the footprint of the extent of the disturbance at any given time.	D / Cl
Action 3	Rehabilitate disturbed areas and include drainage measures to result in clean runoff into natural flow areas/ catchments.	D / Cl
Action 4	Natural flow channels to be reinstated.	D / Cl
Action 5	Reinstate topsoil to prevent erosion and to encourage clean water runoff from the rehabilitated areas.	D / Cl
Action 6	Closure designs of TSFs should ensure that vegetation is reinstated to encourage clean water runoff from the rehabilitated areas.	D / Cl
Action 7	In situ material from the riverbed and side slopes of the natural channel is to be stockpiled (separately) for reinstatement at closure.	D / Cl
Action 8	Restore all drainage systems to former channel bed and bank morphology where practical and optimal.	D / Cl
Action 9	Closure plan to include measures to ensure water generated from the TSF area is deemed clean.	D / Cl
Action 10	Stockpile topsoil, riverbed material and riverbank material of the natural channel separately, for reuse during progressive rehabilitation of the mined out pits.	D / Cl
Action 11	Undertaken a post-rehabilitation audit during the end of life of mine to ascertain whether the environment has returned to its pre-mining use.	D / Cl

7.4 GROUNDWATER MANAGEMENT PLAN

Objective:

The objectives of the measures are to prevent as far as possible impacts on ELSPE Mining and the ecological sensitive areas (Area A and B) from groundwater abstraction as well as to prevent as far as possible impacts relating to the baseline/current quality of groundwater in the region.

Management and Mitigation measures:

Action nr	Management, mitigation and monitoring requirements	Project phase
Issue 1: Groundwater abstraction from the Tubas paleochannel aquifer and pit dewatering have a negative impact on the groundwater users		
Action 1	Acquire abstraction permit and adhere to the permit conditions such as monitoring groundwater levels and monthly groundwater abstraction volumes in the established monitoring and production boreholes.	C / O
Action 2	Use the monitoring data to observe changes in groundwater levels resulting from pumping of production boreholes, and from dewatering the pits.	C / O
Action 3	Borehole WW 206116 to be used for monitoring purposes only. Abstraction from production borehole WW206117, to be pumped at a reduced abstraction rate and monitored, to ensure that abstraction from this borehole does not adversely impact ELSPE Mineral's borehole.	C / O
Action 4	If groundwater levels at ELSPE are negatively affected, RUN may supplement ELSPE Minerals with groundwater.	C / O
Action 5	Establish additional monitoring boreholes during the operational phase, in order to monitor the impact of mine pit dewatering on Areas A and B.	C / O
Action 6	Monitor water levels in monitoring boreholes close to ELSPE Minerals' production borehole.	C / O
Action 7	The monitoring data will be used to determine changes in groundwater levels due to pumping from production boreholes, and where required, additional mitigation may be implemented.	C / O
Action 8	No groundwater will be used in the process plant.	C / O
Action 9	The process plant is to be designed to maximise the recovery and recycle of process liquor so that the requirement for water is minimised.	C / O
Issue 2: Groundwater quality impacts – non mineralised waste and domestic effluent		
Action 1	Refer to section 6.9 – solid and liquid waste management.	C / O
Action 2	Groundwater monitoring to include hydrocarbon analysis for those boreholes that are located downgradient and in proximity to hydrocarbon storage areas.	C / O
Action 3	Storage rooms for paints, hydrocarbons, fuel storages and dispensing sites to be bunded.	C / O
Action 4	Mixing or handling of materials within designated areas to minimize unnecessary spills to the environment	C / O
Action 5	Staff, both permanent and temporary, to be educated on waste management protocols.	C / O
Action 6	Drip trays to be employed in workshops.	C / O
Action 7	Prompt clean-up of any spills.	C / O
Action 8	Hazardous waste to be disposed of by an approved/registered waste disposal company to a certified hazardous waste facility (Walvis Bay, is closest to project area).	C / O
Action 9	Construction of oil and water separators.	C / O
Action 10	Medical waste to be managed as hazardous.	C / O
Action 11	Regular removal of waste from temporary storage areas.	C / O
Action 12	Obtain relevant effluent discharge permit which outlines the best practice guidelines for waste- water treatment plants and comply to the conditions set therein, this ensures compliance to the water regulatory requirements.	C / O / D

Action nr	Management, mitigation and monitoring requirements	Project phase
Action 13	Groundwater monitoring boreholes near STP to be analysed for appropriate biological parameters.	C / O
Issue 3: Groundwater quality impacts – Seepage from the TSF's and WRDs in to underlying aquifers has an impact on the groundwater quality		
Action 1	Mining (and subsequent tailings deposition) not to commence in the designated two starter pits upstream / overlapping with the two ecological sensitive areas A and B, located east of Tumas 3 (Area A) and between Tumas 2 and Tumas 1 (Area B), but rather in further downstream mining areas. Mining and backfilling at these areas to be avoided in early LOM, in order to undertake further detailed studies (refer to the proposed further studies in Section 9.1).	O
Action 2	Backfilled tailings and mineralised waste rock must not allow seepage of tailings/waste leachate into the shallow alluvial aquifer.	O
Action 3	Tailings uranium and vanadium concentrations to be maintained within the range of the geochemically modelled source term and controlled and adjusted on a regular basis.	O
Action 4	Backfilling only Tumas 3 with tailings and waste rock, and other pits with waste rock as per mine plan.	O / D / CL
Action 5	Allowing in-pit tailings time to dry in depositing intervals and covering the tailings with non-mineralised waste rock, as well as contouring it in such a way that erosion is reduced.	O / D / CL
Action 6	A final layer of alluvium to be placed over the waste rock.	O / D / CL
Action 7	The alluvial sand and gravel to be stockpiled when stripping for mining.	O / D / CL
Action 8	Employ pit divider embankments as per mine plan.	O
Action 9	Collect tailing seepage and recycle it in the process water pond as per mine plan	O
Action 10	Numerical groundwater focus models to be developed.	O
Issue 4: Seepage from TSFs and WRDs due to rising phreatic levels and over-deposition result in pollution plume in the shallow alluvium		
Action 1	Phreatic levels in the tailings to be kept at minimum.	O
Action 2	Implement groundwater monitoring programme.	C / O
Action 3	Strategic groundwater monitoring boreholes to be monitored for water quality to detect potential impacts into areas A and B.	C / O
Action 4	Suitable monitoring of shallow and deep boreholes in areas A and B.	C / O
Action 5	Allow sufficient freeboard to prevent phreatic surface in the backfilled tailings to reach the shallow alluvium.	O
Action 6	Employ pit divider embankments as per mine plan.	O
Action 7	Maximise recovery of tailings decant water and recycle.	C / O
Issue 5: Mineralised storage facilities have a negative impact on the groundwater quality of the shallow alluvium and in particular the ecologically sensitive Areas A and B)		
Action 1	No mining should be carried out in these areas in the initial years of mining to allow more detailed studies to be completed to better understand potential impacts of mining operations in these areas and to confirm the best way to conserve these areas. (Refer to section 8.6).	C / O
Action 2	Mining (and subsequent tailings deposition) not to commence in the designated two original starter pits (as per the original mine plan).	O
Action 3	Implement suitable groundwater monitoring programme for baseline development.	C / O
Action 4	Strategic groundwater monitoring boreholes to be monitored for water quality in areas A and B.	O
Action 5	Suitable monitoring of shallow and deep boreholes in (Areas A and B).	O
Action 6	Employ pit divider embankments as per mine plan	O
Action 7	Collect tailing seepage and recycle it in the process water pond.	O
Issue 6: Chemical reagents used in the processing plant have a negative impact on groundwater quality		
Action 1	Storage containers to be tightly closed.	O

Action nr	Management, mitigation and monitoring requirements	Project phase
Action 2	Storage areas to be bunded	O
Action 3	Monitoring boreholes to be strategically located around the plant area, and processing ponds.	O
Action 4	Material Safety Data Sheet (MSDS) be kept and accessible for easy reference.	O
Action 5	Staff working with reagents and inside the plant to be adequately trained in activities and spill management.	O
Action 6	Regular removal of waste from temporary storage areas.	O
Action 7	Empty containers to be disposed of appropriately as per MSDS guidelines.	O
Issue 7: Domestic effluent waste has a negative impact of groundwater quality		
Action 1	Refer to solid and liquid waste management (Section 6.9).	

7.5 AIR QUALITY MANAGEMENT PLAN

Objective:

The objective of the measures is to ensure that operations result in ambient air concentrations for particulate matter ($PM_{2.5}$ and PM_{10}), gaseous pollutants (SO_2, NO_2, CO and VOC) and dustfall rates that are within the selected Air Quality Objectives (AQO) outside the mine site boundary and at the relevant air quality sensitive receptors (AQSR).

Management and Mitigation measures:

Action nr	Management, mitigation and monitoring requirements	Project phase
Issue 1: Air Pollution		
Action 1	The access road will be an all-weather tarmac covered (or similar) road.	C
Action 2	Air quality impacts during construction will be minimised through basic control measures such as limiting the speed of haul trucks; limit unnecessary travelling of vehicles on untreated roads; and applying a chemical dust suppressant such as dust-a-side on regularly travelled, unpaved sections.	C / D
Action 3	When mine vehicles need to use public roads, the vehicles need to be cleaned of all mud and the material with the potential of dusting.	C / D
Action 4	The access road to the Project site needs to be kept clean to minimise carry-through of mud on to public roads. Transported materials prone to windblown dust generation moving off site must therefore be covered to minimise windblown dust.	C / D
Action 5	For the control of vehicle entrained dust a control efficiency (CE) of 90% on unpaved surface roads through the application of chemical surfactants is recommended, with water sprays on the in-pit haul roads to ensure a 50% CE.	O
Action 6	When vehicles need to leave the site, if they have been outside the “clean side” (the clean side of the project area is defined as that area, including the access road, before passing through the secondary security gate adjacent to the Process Plant Area), the vehicles will be cleaned of all mud and the material with the potential of dusting, and transported materials prone to windblown dust generation will be covered to minimise windblown dust.	O
Action 7	Dust from crushing and screening operations and materials transfer points will be controlled using suitable design and operational	O

Action nr	Management, mitigation and monitoring requirements	Project phase
	measures (see the Air Quality Specialist Report for examples). Regular clean-up of materials at loading points will be done.	
Action 8	The backup diesel generators will be operated and maintained according to supplier specifications.	C / O / D
Action 9	Air Quality Monitoring: Maintain the current dustfall monitoring network, comprising of eight (8) single dustfall units. Use the monthly dustfall results as indicators to tract the effectiveness of the applied mitigation measures. Dustfall collection should follow the ASTM method. Refer to section 8.6 for further details.	O
Action 10	Download PM_{10} data remotely on a monthly basis to ensure reporting of dust generating events to establish diurnal, weekly and monthly trends with data availability preferable >90%.	O
Action 11	Continue with passive sampling of SO_2/NOx and VOC concentrations as part of the monitoring network.	O
Action 12	Enforce speed limits on site roads.	C /O D
Action 13	Continuation of meteorological recordings.	

7.6 RADIOLOGICAL MANAGEMENT PLAN

Objective:

The objective of the measures is to prevent direct radiation related health impacts to members of the public.

Management and Mitigation measures:

Action nr	Management, mitigation and monitoring requirements	Project phase
Issue 1: Radiological impacts to third parties (i.e. public receptors)		
Action 1	The construction phase of the proposed Tumas Project must be guided by a fit-for-purpose Radiation Management Plan, which must be approved by the Namibian National Radiation Protection Authority prior to the commencement of on-site activities.	C
Action 2	Commissioning of operations as well as the operational mining phase of the proposed Tumas Project must be guided by a comprehensive Radiation Management Plan, which must be approved by the Namibian National Radiation Protection Authority prior to the commencement of such activities.	O
Action 3	Access to the site in general, and to the radiation sources in particular, will be restricted in all mine phases to prevent third parties from being in close proximity to radiation sources that could cause health impacts.	ALL
Action 4	The contractor camp will only be operational for the construction phase.	C
Action 5	All transported product will be packaged and handled in accordance with suitable Namibian and International standards. Strict product related security measures will be implemented.	O
Action 6	The disposal of radiologically mineral and non-mineral waste onto WRDs and TSFs must be undertaken in a way that minimises the potential for seepage or related emissions and/or releases of radionuclides into the environment.	O
Action 7	The disposal of all mineral waste generated in the proposed mining operations must comply with the Namibian regulatory requirements for the disposal of radioactive waste, as per the Atomic Energy and Radiation Protection Act, Act No. 5 of 2005 and Regulations.	O
Action 8	Seepage and related unintended releases of radiologically relevant minerals, liquids and gases must be minimised by appropriate design of the process plant, WRDs and the TSFs.	C / O

Action nr	Management, mitigation and monitoring requirements	Project phase
Action 9	WRDs and TSFs must be subjected to long-term management ensuring the continued integrity of such structures to minimise the potential seepage and emissions of radionuclides into the environment.	ALL
Action 10	The design and monitoring provisions for WRDs and TSFs must be planned and implemented to ensure that the management of such facilities does not require ongoing or active interventions in the long term, and that such passive management provisions and measures ensure the long-term integrity of all WRDs and TSFs created as part of the operations at the proposed Tumas Project.	C / O
Action 11	All relevant radiological risks must form part of the construction and operational risk register that informs the application of critical mitigation measures at the proposed Tumas Project.	C / O / D / CL
Action 12	Active dust suppression measures (e.g., water sprays) in all mining and processing operations and all transport and ore stacking/waste rock dumping areas (see Air Quality management plan for further details) will be undertaken.	C / O / D
Action 13	Passive dust control measures (e.g., by way of hooding, roofing, and covering) of crushers, screens, conveyors, and other means of ore conveying, will be used where required.	O
Action 14	Active as well as passive dust controls on all on-site service roads (e.g., by way of chemical dust suppressants and/or water sprays) will be utilised.	C / O / D
Action 15	Closure planning must be started early, to ensure that rehabilitation measures can be successively phased in and become an active part of the day-to-day management of WRDs and TSFs	O

7.7 NOISE MANAGEMENT PLAN

Objective:

The objective of the measures is to limit noise pollution impacts.

Management and Mitigation measures:

Action nr	Management, mitigation and monitoring requirements	Project phase
Issue 1: Noise disturbance		
Action 1	Keep a complaint register at the site access point (see details below).	C / O / D
Action 2	Conduct noise monitoring (see details in section 8.7 below).	C / O
Action 3	Noise specialist to re-evaluate noise impact of the Project should any changes be made to the mine plan.	C / O
Action 4	To reduce the impact of blasting, communicate blasting schedules with the public. Signs along the C28 (at the access road intersection) and C14 could be an effective measure to communicate the schedule to visitors to the area.	O
Action 5	The backup generator to be contained within an acoustic enclosure.	O
Action 6	With reference to section 6.7, RUN will develop and implement a concerns/complaints (grievance) process for stakeholders, including a complaints register.	C / O
Action 7	In response to a complaint, RUN will investigate possible causes and if required, make use of a specialist to determine the likely source through monitoring and/or a site inspection. Remedial actions to prevent such events in future can then be taken.	C / O
Action 8	The measures below are considered good practice for noise mitigation: • When selecting suppliers, choose equipment with lower sound power levels where appropriate.	C / O / D

Action nr	Management, mitigation and monitoring requirements	Project phase
	• Avoid unnecessary activities during the night when noise impacts are generally more significant. • Haul trucks, road traffic, and mobile mining equipment will be operated to minimise noise pollution as much as is reasonably possible (see the Noise Specialist Report for examples).	

7.8 ARCHAEOLOGY MANAGEMENT PLAN

Objective:

The objective of the measures is to prevent the unacceptable loss of archaeological sites and related historical information.

Management and Mitigation measures:

Action nr	Management, mitigation and monitoring requirements	Project phase
Issue 1: Damage to archaeological sites and landscape		
Action 1	In the case of six sites associated with the access road and service corridor, re-routing these features to prevent direct impacts.	Prior to C
Action 2	Apply relevant modifications to the Project layout to prevent destruction or disturbance of two sites located on the margins of the processing plant.	Prior to C
Action 3	In the case of the sites associated with outcropping Abbabis granites impacts associated with the Tumas Project could be mitigated by avoiding the granites so as not to encroach on any archaeological sites.	Prior to C
Action 4	The grass seed harvesting basecamp site (QRS 174/36) located in the Tumas Project area during the course of the survey to be further investigated beyond the level of documentation presented in the Archaeology Report and potentially dated by the application of the Optically Stimulated Luminescence technique. In addition, the site merits systematic excavation of selected features within it.	Prior to C
Action 5	One other site (QRS 174/17 & 18), a factory site for the production of hunting projectiles, also merits excavation and possible dating by means of the same technique. Area excavation over approximately 10 m^2 be carried out at QRS 174/17 & 18 to map and recover a representative sample of stone artefact production evidence with the possible recovery of samples suitable for dating the occupation of the site.	Prior to C
Action 6	Excavation should be carried out on at least two or three of the stone shelters on QRS 174/36 to recover evidence associated with the occupation of the site.	Prior to C
Action 7	Limit mine infrastructure, activities and related disturbance.	C / O
Action 8	No archaeological site to be disturbed without relevant permit. Where archaeological sites will be disturbed and/or destroyed, the information in the specialist report must be used to apply for the necessary permits that are required in terms of the National Heritage Act 2004.	Prior to C
Action 9	Educate specific workers (temporary and permanent) about tell-tale signs of archaeological sites and the action to be taken if one is identified.	C / O / D
Action 10	Develop a chance find procedure. The key component of which is to ensure that the site remains undisturbed until a specialist has assessed the site, assessed the potential damage, advised on the necessary management steps and advised on the requirements for authority consultation and permitting.	C
Action 11	If relics are found on site, report these findings to the Environmental Manager who will take the appropriate action.	ALL

7.9 VISUAL MANAGEMENT PLAN

Objective:

The objective of the measures is to minimise visual impacts as far as possible.

Management and Mitigation measures:

Action nr	Management, mitigation and monitoring requirements	Project phase
Issue 1: Visual and landscape disturbance to the environment		
Action 1	Land disturbance will be limited to what is prudently necessary.	C / O
Action 2	In the shaping of any structures that will remain after closure (i.e. WRDs), harsh and angular structures will be avoided where possible and care should be taken to integrate these structures into the surrounding landscape.	C / O / D
Action 3	Consider visual impacts when planning final location of dumps and stockpiles.	C
Action 4	Locate the Process plant (and associated infrastructure as far away from the Abbabis granites as possible (to the south).	C / O
Action 5	All painted surfaces should blend into the natural surroundings	
Action 6	Limit visual intrusion by dust (see Air Quality Management Plan).	C / O / D
Action 7	Litter will be prevented.	C / O / D
Action 8	Night lights will be used only where necessary (i.e. minimise the number of light fixtures to a minimum) and will be designed to illuminate only that which requires illumination, including security lighting.	C / O / D
Action 9	Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the Plant Site and in mining areas and along haul roads.	C / O / D
Action 10	Avoid high pole top security lighting along the periphery of the site and use only lights that are activated on illegal entry to the site, where relevant.	C / O / D
Action 11	Consider the guidelines provided by MEFT in the Park Management Plan (MEFT, 2021) on minimising the impact of lighting.	C / O / D
Action 12	Visually monitor the light pollution, in consultation with MEFT and install improved lighting measures if required.	C / O / D
Action 13	All structures to be broken down and dumped into the final pit or sold as recycled material (if not radioactive contaminated).	D / C
Action 14	The impacted landscapes need to be shaped into a natural form following natural hydrological patterns.	
Action 15	Rehabilitation of the access road and haul roads such that natural vegetation cover is encouraged.	

7.10 SOCIO-ECONOMIC MANAGEMENT PLAN

Objectives:

The objectives of the measures are as follows:

- To enhance positive economic impacts during the construction and operations phases and minimise negative impacts during decommissioning and closure.
- To enhance positive impacts relating to job creation during the construction and operations phases and minimise negative impacts during decommissioning and closure.
- To avoid/minimise potential impacts associated with poaching, littering and adverse social impacts arising from single worker camps.
- To minimise potential impacts associated with in-migration.

- To reduce the potential for traffic impacts.

Management and Mitigation measures:

Action nr	Management, mitigation and enhancement measures	Project phase
Issue 1: Economic Impacts		
Action 1	The following are proposed enhancement measures: • Give tender preferential weighting to supply companies owned by empowerment beneficiaries. • Give tender preferential weighting to women-owned and women-managed companies over male-led companies, to promote gender equality. • Give tender preferential weighting to prime contractors who include, and support suppliers owned by empowerment beneficiaries in their procurement chain. As an example, the measurement used by NamPower is the % procurement spending allocated to businesses owned by empowerment beneficiaries (e.g., mentorship programmes, joint ventures, sub-contracting). • Implement a procurement policy which promotes the use of small and medium enterprises (SMEs); also to purchase Namibian-made goods and services whenever possible or those from businesses within the South African Development Community.	C / O
Action 2	Ensure there is a mine closure plan in place when operations begin.	D / C
Action 3	Inform stakeholders, such as suppliers and government, as early as possible, of the possibility of moving to care and maintenance or closure so they can make financial adjustments.	O / D
Issue 2: Job creation and Skills Development		
Action 1	To promote local recruitment during construction and operations to minimise in-migration: • Put in place Human Resources (HR) policies which give preference to training and employing / contracting local residents (people who currently live or who originate from the central coastal region) to the extent possible. • Give tender preferential weighting to construction and supply companies which demonstrate their use of the local (Erongo) labour force and specifically encourage women to apply for any jobs available.	C / O
Action 2	To promote equality among empowerment beneficiaries and women: • Prepare, implement, monitor and evaluate a three-year Affirmative Action Plan, in line with the 1998 Act. Examples of recommended actions include: o Recruit a balanced gender and age workforce – not only youth (under 35 years) but also people with experience of different ages, to minimise workplace social problems. o Prioritise the selection of women for training and recruitment. o Adopt a focused approach to leadership training and development for supervisory and management levels to enable previously disadvantaged employees and women to rise through RUN.	C / O
Action 3	To promote stable working conditions: • Ensure that employees, and those of its contractors, are paid market related wages and pension contributions, with housing allowances (that can promote home ownership) and medical aid made available to those personnel seeking these benefits. • Foster good labour relations and take responsibility to respect employees' human rights.	C / O

Action nr	Management, mitigation and enhancement measures	Project phase
	• Establish credible and trusted operational procedures to address employees' concerns and grievances.	
Action 4	To promote skills development: • Give tender weighting to construction companies that will detail how and what skills they will transfer to local workers during construction or the % of gross wages (including the VET Levy) they spend on training. • Have a long-term skills development programme in place which includes elements such as community outreach, apprenticeships, internships, bursaries, graduate programme, study assistance and in-house training.	C / O
Action 5	Plan for mine closure early in Project development.	D / C
Action 6	Inform workers promptly of any impeding reduction in the workforce to give them maximum time to make financial adjustments.	D / C
Action 7	Promote continuous learning programmes to diversify and upgrade employees' skills.	D / C
Action 8	Ensure skills upgrading during employment on the project is documented and accredited where possible so skills are recognised with future employers.	D / C
Action 9	Maximise the permanent workforce and provide pension/provident plans in accordance with the Namibian law.	D / C
Action 10	Provide training on personal financial management, as part of RUN's corporate social responsibility.	D / C
Action 11	Promote home ownership throughout the workforce.	D / C
Issues 3: Temporary housing on site		
Action 1	Construct a perimeter security fence around the accommodation camp, with access gates manned by security personnel and prohibit access to the NNNP. The fence will also help trap any litter blowing into the environment.	C
Action 2	Make available reusable shopping bags for when workers are taken into town for their days off, and provide rubbish disposal and waste management services at the camp.	C
Action 3	Report poachers and workers who contravene park rules.	C
Action 4	Train and hold on-going awareness campaigns to educate contractors about the park rules and the importance of biodiversity and the harm caused by litter.	C
Action 5	Operate an alcohol-free and drug-free worksite which will include testing of employees/contractors on entry to the work site, at the beginning of shifts and at any time on duty.	C
Action 6	Minimise the number of shared rooms, occupied at the same time, to reduce the real risk of spreading HIV and other sexually transmitted diseases within the workforce and to their families.	C
Action 7	Provide fencing around the female construction workers' accommodation area to offer protection from unwanted male visitors.	C
Action 8	Provide compulsory training to all employees and contractors on personal safety, mutual respect and sexual health including posters and other means of communication to remind and highlight expected behaviour.	C / O
Action 9	Provide recreational and educational facilities, e.g., satellite TV, computers, internet and study area, and gym and sports area to keep off-duty construction workers happily occupied without alcohol, drugs and sex.	C
Action 10	Provide a constant supply of free condoms in every ablution block and toilet and educational informative posters.	C
Action 11	Plan to reuse materials when designing the construction camp. Upon closing the camp, the buildings will be checked for radiation, decontaminated if necessary, and then made available to reconstruct	C

Action nr	Management, mitigation and enhancement measures	Project phase
	them into school classrooms, community buildings or for other purposes, if practicable.	
Issue 4: In-Migration and Housing in coastal towns		
Action 1	Develop a stakeholder engagement plan early in the Project process, to ensure that RUN maintains regular, open communication channels with key stakeholders such as the Regional Governor, Erongo Regional Council, the municipalities of Walvis Bay and Swakopmund and other key stakeholders.	C / O
Action 2	Actively engage with these key stakeholders to jointly plan recruitment strategies which will enable existing local residents of Walvis Bay and Swakopmund to register their interest in employment with RUN and its contractors, early in the Project's development, to discourage in-migration from elsewhere.	C / O
Action 3	Identify high performing unskilled/semi-skilled local workers during construction for training and recruitment for the operations phase.	C / O
Action 4	Engage with key stakeholders to plan and manage the potential negative impacts of project-induced in-migration, by planning for new arrival areas that include essential infrastructure such as water points, toilets and lighting.	C / O
Action 5	Corporate social investment will incorporate supporting efforts to provide affordable, low-cost housing, quality education and other essential services.	C / O
Action 6	Offer favourable salary packages which will encourage employees to invest in housing in the coastal towns which will also improve the housing stock.	C / O
Issue 5: Traffic impacts		
Action 1	All vehicles should be fitted with a tracker to monitor speed.	C / O
Action 2	Promote basic road safety behaviour for all RUN employees and contractors through training and awareness. Typical issues include the following: • Keeping to safe speed limits, but as a minimum all specified road speeds will be adhered to. • Operational protocol for spacing between other slower moving trucks, to enable passing of other vehicles. • Ensuring that drivers all have valid licences. • Making sure that all vehicles are roadworthy. • Zero tolerance for drinking and drugs whilst driving. • Using lights appropriately for night driving. • Prohibit night driving to and from the Project site other than in exceptional circumstances as approved. • Lookout for cyclists and slow down when cyclists are noted.	C / O
Action 3	C28 Road maintenance • RUN to liaise with the Namibia Roads Authority (NRA) to request ongoing maintenance / upgrades of the C28, where required - by NRA. • RUN to ensure ongoing road maintenance of the access road to the mine. • All standard safety protocols relating to working within public roads to be adhered to.	C / O
Action 4	Liaise with the Walvis Bay Municipality regarding the most suitable roads/routes to be used in and around Walvis Bay by construction vehicles and transport of chemicals, product, etc. to and from the site.	C / O

8 MONITORING REQUIREMENTS

8.1 FLORA

- Monitor the effect of redirected water flow on down-stream vegetation and of dust on sensitive areas and flora, and an improved botanical inventory will further inform management actions and rehabilitation requirements.
- Monitor sites where additional water could potentially lead to the establishment of invasive alien plants.
- If protected species cannot be avoided, transplant into suitable habitat and monitor their survival.
- Monitor sites where disturbance and/or additional water could potentially lead to the establishment of invasive alien plants.
- Monitor effect of dust on vegetation.
- Monitor dust by positioning dust bucket in lichen-dominated area and near marble ridge.
- Monitor rehabilitated sites to measure progress and success.

8.2 FAUNA (INCLUDING AVIFAUNA)

- Monitor (and document) all mortalities related to the PV plant, mining activities, etc.
- Monitor the success of reintroductions and overall rehabilitation every six months for up to two years after rehabilitation.
- Monitor the attraction of animal species to the site because of the artificial provision of otherwise scarce resources. Use this information to guide adaptive management measures.
- Monitor fauna and flora in general to update the species list for the Project area.

The recommendations for avifauna monitoring, specifically relating to the proposed PV Power plant, are made to develop and implement an adaptive management approach.

8.2.1 8.6.1 AVIFAUNA MONITORING REQUIREMENTS

- Conduct a pre- and post- construction monitoring programme; minimum 2-3 x 3-5 days over 6 months (including peak season); carcass searches.
- The additional data will be used to further inform the Project's detail design and final infrastructure layout, e.g. should activity of any significant (priority) species be recorded, and this activity require further mitigation (or monitoring).
- The results of post construction monitoring should be reviewed periodically, and also compared with the results of the pre-construction monitoring.
- The solar fields should be monitored for bird nests in the form of searching the ground between arrays of solar panels, and checking on the panels themselves. The searches should be done on foot.
- Any additional structures (e.g. masts, under guy cables, fences should be monitored.

- Both mortalities and live birds should be monitored; these would include any species that appear to be attracted to the area. If there is a need, camera traps could be used to document the occurrence of sensitive species, such as waterbirds and or raptors, or problematic species.
- All bird mortalities be recorded on a standardised form, with the GPS coordinates and structure involved and other details, and photographs of the carcass (including head and beak), structure and point of impact if possible. For any collision incidents on the solar panels, the presence/absence of (low) fog the night before, and the moon phase should be noted, to investigate any climatic patterns. Monitoring results should be discussed with the avifauna specialist on a quarterly basis, or more frequently if required.
- Monitor the attraction of birds to novel (artificial) habitats and resources. Monitoring is essential to identify (potential) problem areas; any movement of hitherto unrecorded species onto or beneath the solar panels must be monitored; and any resulting negative impacts should be addressed accordingly.
- Monitor numbers of Pied Crow and Cape Crow; should these show an increase, specifically address the management of food waste.
- Monitor the injuries / mortalities of birds to guide adaptive management measures, if necessary, on a species-specific basis.

8.3 ECOLOGICAL MONITORING

An informative monitoring program is one of the essential components of an effective adaptive management cycle. To be sustainable, the monitoring program should be compact and only essential data collected and processed. Fewer high-quality data points, consistently collected over a longer period, are worth more than abundant, inconsistent or inaccurate data. In terms of monitoring ecologically important processes and functions, the following are suggested:

1. Monitor plant health, recruitment and mortality rates of trees and dominant shrub species annually in permanently marked transects in high-value or threatened habitats, e.g. highly sensitive areas, dust-prone habitats, etc. These can also be used to determine the reference state for restoration targets (see restoration section in the Ecological Specialist study). To better understand water-plant dynamics, vegetation monitoring plots associated with the Tumas River system and borefield should preferably be placed close to monitoring boreholes:
    - Health of trees and shrubs can be qualitatively recorded, supported by a photo guide created for this purpose. The following health categories may be adopted:
        - 0 = dead
        - 1 = stressed, more than half of the plant shows signs of water stress/dying
        - 2 = medium, less than half of the plant shows signs of water stress/dying
        - 3 = thriving, new growth on more than half of the plant's branches
    - Plant height and average canopy diameter for trees and shrubs, from which cover and population structure can be calculated.
    - Fixed point photos in all habitats and monitored annually at the end of the rainy season (April/May).

- Monthly trend in the Normalized Difference Vegetation Index from high-resolution satellite systems (e.g. Landsat or Sentinel 2) extracted for the high biomass areas (Figure 5) and compare with the mean or median value calculated for historical data.

2. Monitor water table levels regularly in monitoring boreholes and where relevant correlate with vegetation health assessment (point 1 above).
3. Monitor water quality in selected monitoring boreholes in accordance with groundwater monitoring plan.
4. Monitor mammals and predators using non-invasive methods, e.g. trail cameras, in the high biomass Area A. In Area A the monitoring should also target small mammals, e.g. Littledale's Whistling Rat activities.
5. Monitoring rainfall. Continue to monitor meteorological with the onsite weather station (including temperature, wind speed, fog and humidity). Rainfall should be measured also in the eastern and western parts.
6. Keeping an 'event' register where observations related to biodiversity and ecological processes/drivers are recorded, e.g. flood events in Tumas River and/or tributaries, patchy rainfall events, extreme weather, fire, sightings of migrating game and birds of conservation importance or unusual concentrations, population eruptions, etc.

The monitoring plan will be documented and the methodology clearly described to ensure sustainability and consistency between observers.

8.4 SURFACE WATER MONITORING

- Sample surface water during a rain event (if it occurs), before mining starts and as often as possible when surface drainages are in flood when the mine is in full operation.
- Align daily inspections to surface water monitoring requirements:
    - Ensure that checking for hydrocarbon or hazardous substance spills is included in the daily inspections.
    - Report spillages as per the incident management procedure of RUN and as required by Namibian legislation.

8.5 GROUNDWATER MONITORING

A draft groundwater monitoring plan has been developed for the project by SLR (refer to Appendix 7 of the Tumas Project EIA Report) which encompass water level measurement and the analysis of the relevant groundwater chemistry parameters, as well as a monitoring schedule. The monitoring programme will be reviewed to include new monitoring bores and to revise parameters as appropriate. The groundwater monitoring programme (see Figure 4) should continue to further redevelop the baseline dataset. The groundwater monitoring programme will be amended to include additional boreholes required to be installed prior to the commencement of mining operations.

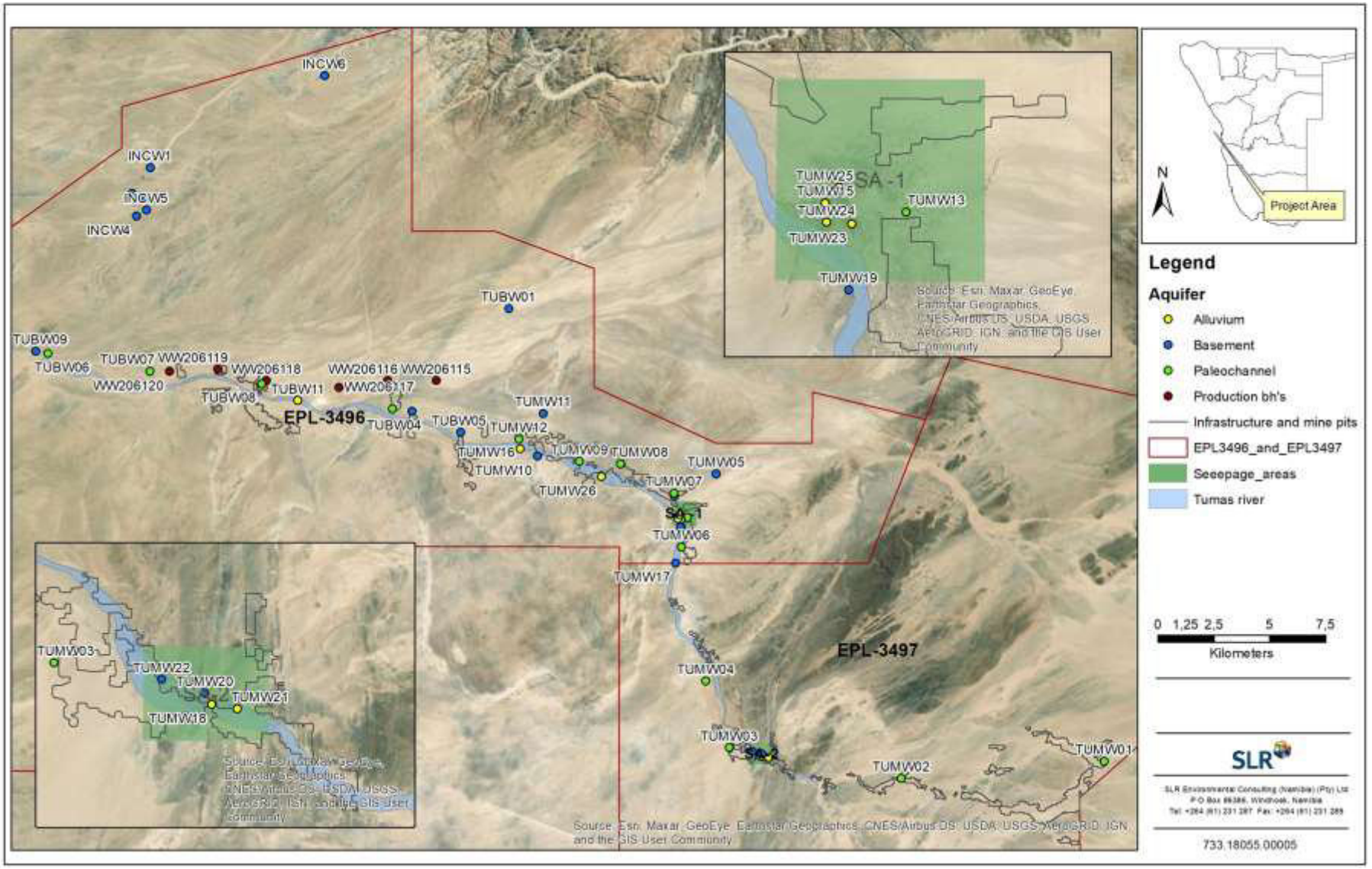

FIGURE 4: LOCATION OF PRODUCTION AND MONITORING BOREHOLES FOR THE TUMAS PROJECT (SLR, 2022)

8.6 AIR QUALITY MONITORING

Ambient air quality monitoring can serve to meet various objectives, such as:

- Compliance monitoring;
- Validate dispersion model results;
- Use as input for health risk assessment;
- Assist in source apportionment;
- Temporal and spatial trend analysis;
- Source quantification; and
- Tracking progress made by control measures.

The current dustfall monitoring network (see Figure 5), comprising of eight (8) single dustfall units, will be maintained and the monthly dustfall results used as indicators to tract the effectiveness of the applied mitigation measures.

The dustfall monitoring network should follow the American Society for Testing and Materials (ASTM) standard method for collection and analysis of dustfall (ASTM D1739-98). The ASTM method covers the procedure of collection of dustfall and its measurement and employs a simple device consisting of a cylindrical container exposed for one calendar month (30 ±2 days). The method provides for a dry bucket, which is advisable in the dry environment.

The E-Sampler , or a similar dust monitor, will be maintained throughout the LOM, and will incorporate the following

- PM_{10} data will be remotely downloaded on a monthly basis to ensure reporting of dust generating events to establish diurnal, weekly and monthly trends.
- The E-Sampler will be checked monthly to ensure the instrument is in a working condition. The flow rate of the E-Sampler must always be around 2 litres/minute (range is 1 to 3.5 litres/minute).
- The E-Sampler results will be verified once a year by gravimetric sample taking concurrently with the continuous light scattering over a 24-hour period to establish the K-factor, and the data records adjusted accordingly.
- Gravimetric analysis will be undertaken for radionuclide analysis, except that the filter may need to be exposed for a longer period to collect enough dust for the radionuclide analysis and chemical analysis.
- Data availability from the E-Samplers, should be 90% (SANAS, 2010).
- Prior to a review, outliers that extend over a long period should be eliminated or retained only if adequate information is furnished pertaining to their origin.

Measured and simulated SO_2/NOx and VOC concentrations were low, hence continuous ambient measurements of these pollutants are not considered mandatory. However, since passive diffusive monitoring provides a cost-effective way of measuring gaseous pollutant concentrations, it is recommended that bi-annual passive sampling of SO_2/NOx and VOC concentrations be continued as part of the monitoring network.

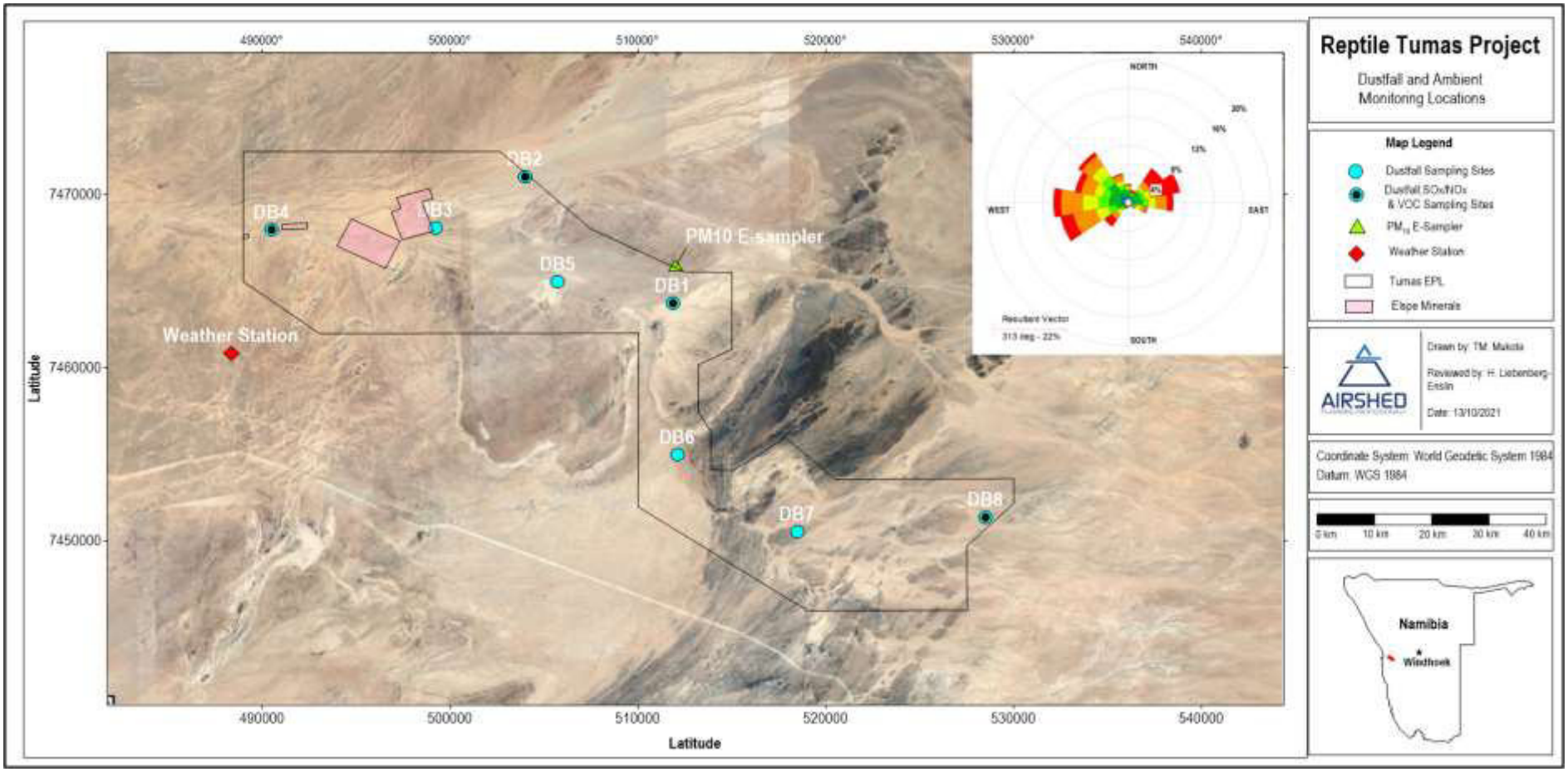

FIGURE 5: DUSTFALL AND AMBIENT MONITORING LOCATIONS AT THE PROPOSED TUMAS MINE (AIRSHED, 2022)

8.7 NOISE MONITORING

The noise monitoring requirements are summarised in Table 7.

TABLE 7: NOISE MONITORING REQUIREMENTS

Requirement	Description and detail
Frequency	One campaign upon commencement of operations, specifically the processing plant. Locations to be selected by specialist in consultation with RUN will depend on areas being actively mined. Also, if required, as part of resolving complaints.
Procedure	SANS 10103: 2008.
Parameters to be recorded	Minimum L_{AFeq}, L_{AIeq}, statistical levels i.e., L_{AF90}, octave or 3rd octave frequency spectra.
Field notes	Weather conditions, noise incidents, observations as to the general acoustic climate, and if possible, traffic, should be noted during measurements.

8.8 RADIOLOGICAL MONITORING

- Monitoring of all radiologically relevant environmental emissions must commence once construction activities start at the proposed Tumas Project, including relevant mineral, liquid, and gaseous emissions into the environment;
- Monitoring of ambient atmospheric total suspended particulate concentrations, as well as corresponding PM_{10} and $PM_{2.5}$ concentrations, and ambient radon concentrations, must commence once construction activities at the proposed Tumas Project start, and be intensified with the commissioning of on-site operations;
- On-site monitoring must also include meteorological parameters and development of baseline radionuclide concentrations in borehole water at and around the proposed mining site; and
- Public and occupational exposure dose monitoring programs must commence at the start of construction activities, guided by the Radiation Management Plan to be prepared and approved by the Regulator under the provisions of the Act, for this preparatory phase of the proposed Tumas Project, and be intensified with the commissioning of on-site operations.

8.9 SOIL MANAGEMENT MONITORING

Regular inspections of soil stockpiles and rehabilitated areas will be undertaken to ensure that the Topsoil Management Plan and Procedure are being implemented.

8.10 MINERAL WASTE FACILITIES

The following issues will, where relevant, be monitored on a quarterly basis and reported as required by relevant permits and authorisations issued to RUN by the authorities:

- Slope stability, integrity of walls TSFs, presence of seepage, capacity of dirty water system, and functioning of drains in the mineral waste facilities.

- The volume of mineralised waste generated as well as the disposal area, height and footprint / volume of mineralised waste disposal/storage facilities will be monitored and recorded as required. The results will be reported bi-annually.

8.11 NON-MINERALISED SOLID AND LIQUID WASTE

Weekly inspections of non-mineralised waste handling and management facilities will be undertaken to ensure that the waste management procedures are being implemented. The volume and type of non-mineralised waste, and the disposal destination, will be monitored and recorded as required. The results will be reported bi-annually.

9 ADAPTIVE MANAGEMENT APPROACH AND FURTHER STUDIES

The biodiversity assessment was conducted during a prolonged dry period, resulting in the under representation of the actual diversity of the flora and fauna of the study area. In addition, the dependence of perennial plants on underground water sources and water quality in the Tumas River system is not well understood. An adaptive management approach is therefore recommended.

Adaptive management entails that management decisions are based upon the best available knowledge at the time, but with an effort to improve the knowledge base through dedicated research and analysis of data generated by a robust monitoring program.

An adaptive management framework has four components:

- A description of the system and its dynamics (e.g. baseline reports),
- Definition of specific, measurable, achievable, relevant and time-bound (SMART) objectives,
- Definition of ecological management actions, and
- Definition of a robust monitoring programme to serve as the basis for management decisions and to improve the knowledge base.

Most, if not all, of the biodiversity studies would benefit from additional surveys during favourable climatic conditions to augment the current baselines. This can be accommodated in the adaptive management framework where certain areas and actions are avoided until a better understanding of the various taxa and underlying ecological processes and functions are reached.

9.1 FURTHER STUDIES

The following “further studies” need to be further refined in consultation with the relevant specialists, as and where required.

9.1.1 FLORA

The effect of two mining-related aspects on vegetation and flora will require further monitoring:

- The effect of diverted water flow on downstream vegetation.
- The effect of dust on sensitive areas and flora.

Also an improved botanical inventory will further inform management actions and rehabilitation requirements.

Effect of diverted water flow on downstream vegetation

A monitoring program will be required to track potential changes to the vegetation related to the mining-altered landscape of the Tumas River and its tributaries. This will need to be developed once all engineering parameters related to the opening of the first pit are available.

Effect of dust on vegetation and flora

At present very little is known about the impact of dust on Namib vegetation. To some extent Namib plants are likely resilient to dust impacts, as dust is a natural phenomenon in the Namib, but it is generally established that exposure to dust reduces photosynthesis and respiration, blocks stomata and abrades the leaf surface (e.g. Farmer 1993, Grantz et al. 2003). Natural dust events are usually short-lived (days at most) and dust is washed off during rain and fog events in the Namib Desert. A continuous dust source in one locality is a different matter and could negatively impact plants. Most susceptible are evergreen plants such as succulents and plants which easily capture dust. Several succulent species grow in sensitive areas near potential dust sources and these could serve as indicators.

Areas where increased dust levels could affect species of conservation concern such as protected succulents (e.g. Aloe, Hoodia, Lithops) need to be identified and a monitoring program developed and implemented. The first step would be to establish the extent (and duration) of dust plumes, and a monitoring program could be developed based on these findings.

Improved botanical inventory

Surveys should be conducted following rainfall that results in a good vegetation season in this area to improve the botanical inventory, particularly by looking for bulbs, annuals and elusive plants of conservation importance such as *Raphionacme haeneliae*. As the mine will be developed in phases, information from such surveys could still inform further planning of the next phases of the Tumas project and would also contribute to developing a detailed rehabilitation plan. A good rainy season in future should therefore not be missed and be utilised for more intensive field surveys.

Seed collections of key plant species for re-planting efforts rehabilitation should be undertaken simultaneously during a good vegetation season.

9.1.2 ECOLOGY

The ecologically sensitive areas identified (Areas A and B) overlap identified resource deposits. Mining may irreversibly alter or destroy the integrity and function of these areas, but these conclusions are based on incomplete information. As a precaution, and in line with adaptive management, the approach recommended is therefore to postpone mining in these areas and re-assess when further information has been obtained. Below are suggestions for such research topics:

1) Consider commissioning output-oriented research to define key community associations, ecological requirements and time frames to re-establish core habitats associated with the Tumas drainage system. Specifically investigate an in-depth invertebrate biodiversity and distribution survey after widespread rain (over >80% of the proposed mining area) over 60 mm, focussing on core short-lived indicator species (spiders, grasshoppers (Orthoptera), beetles (non-tenebrionid Coleoptera), butterflies and moths (Lepidoptera), flies (Diptera)).
2) Desert shrubs are long-lived, slow-growing and little is known about the conditions influencing propagation and transplantation success. In a disturbed coastal environment the natural establishment rate of *Salsola nollothensis,* for example, was very slow (Burke *et al.* 2011). One of the restoration objectives recommended is to re-establish shrub species including *Salsola nollothensis* (Burke 2021).

Important research aspects to be considered include suitable propagation methods for local conditions, e.g. seeds, cuttings or transplantation, as well as survival and growth rates of transplanted/propagated plants. The habitat and substrate preferences should also be studied for the target species. This can build on the research conducted for the rehabilitation of *Salsola nollothensis* in a coastal environment (Burke *et al.* 2011), but other plant species should also be considered in a detailed restoration/rehabilitation plan.

3) Update the distribution map and population status of Littledale's Whistling Rats in the study area, NNNP, coastal areas and in the Swakop River (and tributaries) north of the park.
4) Comparing the genetic similarity of the Whistling Rat population with other populations. The large hummocks, that formed in associations with the *Salsola* sp in the Tumas system is potentially highly sensitive due to the distinct and highly isolated population of whistling rats (*Parotomys littledalei*), and potentially also of the hairy-footed gerbil (*Gerbillurus vallinus)*. It is unknown for how long these populations have been isolated in the Tumas, but the large hummocks, and in particular the exceptionally thick trunks of the *Salsola* shrubs, suggest this may be a relict population of considerable age. This can potentially be accomplished by undertaking comparative population genetics on the rodents to obtain a likely age of isolation through, for example, Bayesian Evolutionary Analysis Sampling Trees analysis.
5) Determining the age of the large *Salsola* hummocks in the Tumas system. As both sand accumulation rates and the rodent populations are associated with these shrubs, the estimated ages for the shrubs would indicate a minimum age for the habitat. The age of the aeolian sand accumulations can potentially be determined through OSL dating of a cohort of hummocks. The age of the *Salsola* shrubs can also be determined through dendrochronology, i.e. 14C dating of stem growth. Determining the growth rates and ages of shrubs through dendrochronology is possibly the most cost-effective. To determine if the latter is viable, a few dead trunks were cut to evaluate the internal structure. By measuring trunk thicknesses of a population of shrubs along three transects, and measuring the size of the hummocks of each shrub, it is possible to develop an age model for the site.
6) Vegetation – Groundwater dynamics in the Tumas river system. It is uncertain how dependable especially shrubs such as *Salsola nollothensis* are on groundwater resources and how tolerant of changes in water quality. This research should preferably involve the collaboration of both ecologists and hydrogeologists.

9.1.3 GROUNDWATER

Groundwater study: A groundwater study will be developed and executed on the Tumas Project Site and will aim at determining the source of groundwater to the ecologically sensitive areas A and B. The groundwater study will involve, amongst others, the development of a detailed local conceptual model, the construction of additional monitoring bores, groundwater level and quality monitoring. Analysis of the data collected under the groundwater study will be used to assist in developing a management plan for the ecologically sensitive areas identified as Area A and B.

Appendix A – NNNP Park Rules

Appendix B – Applicable Environmental Quality Objectives (EQO) and Targets from the Strategic Environmental Assessment (SEA) 'Uranium Rush'

EQO	Aim of the EQO	Targets
EQO1: Socio-economic Development	Uranium mining improves Namibia´s and the Erongo Region's sustainable socio-economic development and outlook without undermining the growth potential of other sectors.	Contribution of mining to the economy increases over time.
EQO2: Employment	Promote local employment and employment equity.	Uranium companies hire locally where possible.
EQO3: Infrastructure	Key infrastructure is adequate and well maintained, thus enabling economic development, public convenience and safety.	Most employees are housed in proclaimed towns.
		Roads are well maintained; traffic frequency is acceptable for tourism/other road users and traffic is safe.
		The harbour authorities provide reliable, accessible and convenient loading, offloading and handling services.
		The public do not suffer disruptions in electricity supply as a result of uranium mining.
		All sewage, domestic and hazardous waste sites are properly designed and have sufficient capacity for the next 20 years, taking into account the expected volumes from mines and all associated industries.
		The management of waste sites meets national standards.
		The management of mines' mineral waste sites (tailings and waste rock facilities) meets national standards.
		A sustainable waste recycling system is operational in the Central Namib, servicing the uranium mines and the public.
EQO4: Water	Ensure that the public have the same or better access to water in future as they have currently; quantity and quality of groundwater are not adversely affected by mining activities.	Uranium mining does not compromise community access to water of appropriate quality.
		Uranium mining does not compromise the water quality in the lower Khan and Swakop rivers.
		Additional water resources (notably desalinated water) are developed to meet industrial demand.
EQO5: Air Quality	Workers and the public do not suffer significant increased health risks as a result of exposure to dust emission from uranium mines.	Ambient PM_{10} concentrations at public locations and mines should not exceed the required target/limit to be set for the Erongo Region for both annual and 24-hour averages. The target/limit should be based on international guidelines but should consider local environmental, social and economic conditions.
		Dust fallout levels at residences in towns should not exceed the recommended limit of 600 mg/m2/day.

		Mitigation measures to be implemented by mines at all major dust generating sources such as haul roads, materials transfer points and crushing operations. The best practical dust suppression methods should be implemented and monitored through dust fallout buckets at strategic locations.
EQO6: Health	Adequate health services are available to all; workers and the public do not suffer significant increased health risks from uranium mining.	Increments in the concentrations of uranium, thorium and health relevant nuclides of the uranium, thorium and actinium decay chains such as Ra-226 and Ra-228 (above respective background concentrations) in air and water (ground and surface) that originate from uranium mines, must be constrained so that the cumulative radiation dose to members of the public is reasonably minimized and does not exceed 1 mSv per annum above background.
		The cumulative radiation dose to members of the public and radiation workers does not exceed the legal limit.
		No measurable increase, directly or indirectly attributable to uranium mining and its support industries in the incidence rates of the following: • Industrial lung disease (including pneumoconiosis) • Lung cancer and other industrial-related cancers • Industrial induced renal damage • HIV/ AIDS, tuberculosis • Industrial dermatitis
		An increase in qualified health workers available to all in the Erongo Region, reaching 2.5 per 1000 of the population by 2020.
		An increase in registered healthcare facilities in Erongo, available to all, reaching 2.5 acute care beds per 1000 population and 0.5 chronic care beds per 1000 population by 2020.
		An increase in ambulances in Erongo, reaching 1 per 20,000 by 2020.
EQO7: Effect on Tourism	The natural beauty of the desert and its sense of place are not compromised unduly by uranium mining; prevent conflicts between tourism and mining, so that both industries can coexist in the Central Namib.	Uranium mining does not result in net loss of publicly accessible areas.
		Direct and indirect visual scarring from uranium mining is avoided or kept within acceptable limits.
		Improved protection of listed areas.
EQO8: Ecological Integrity	Ecological integrity, flora and fauna are not compromised by mining; mines form conservation partnerships.	The mining industry and associated service providers avoid impacts to biodiversity and ecosystems, and where impacts are unavoidable, minimisation, mitigation and/or restoration and offsetting of impacts is achieved.
		Mines and associated industries support conservation efforts in Namibia.
		Authorisation to mine is denied if the extinction of a species is likely.

		No secondary impacts occur.
		Water table levels, and water quality standards are described, and ephemeral river ecosystems are monitored to ensure that these standards are not compromised.
		Uranium mining does not compromise surface and groundwater availability.
EQO9: Education	Erongo residents continue to have affordable and improved access to basic, secondary and tertiary education.	Improved quality of school education.
		More qualified artisans, technicians, geologists, accountants and engineers.
EQO10: Governance	Regulators and industry protect Namibia's reputation as a responsible uranium producer by means of ethical conduct and environmentally, socially and financially responsible practices.	Sensitive areas in need of protection are not generally available for prospecting or mining.
		The defined process is always followed in the allocation of all kinds of mineral licenses and the establishment of supporting infrastructure.
		Post-implementation monitoring is regular, efficient and outcomes based.
		Transgressions are noted and acted upon timeously.
		The 'Namib uranium province' is regarded internationally as an area where ethical, environmentally, socially and financially responsible companies prospect and mine uranium.
EQO11: Heritage	Uranium exploration and mining will have the least possible negative impact on archaeological and palaeontological heritage resources.	Mining industry and associated service providers avoid impacts to archaeological resources, and where impacts are unavoidable, mitigation, restoration and /or offsetting are achieved.
		Development of a general research framework to identify gaps in scientific knowledge.
EQO12: Mine Closure and Future Land Use	Maximize the sustainable contribution to society mines can make post-closure; minimize social, economic and biophysical impacts of mine closure.	• The planning process is initiated early (in the feasibility study stage) to ensure that reasonable opportunities for post closure development are not prevented by inappropriate mine design and operations. • Mine closure plans need to be based both on expert and stakeholders' input, and consider site-specific risks, opportunities and threats as well as cumulative issues. These must include socioeconomic opportunities for nearby communities and the workforce, demolition and rehabilitation and post closure monitoring and maintenance. • The plan needs to contain accepted and agreed objectives, indicators and implementation targets. • The plan needs to be subjected to periodic critical internal and external reviewed, must have written GRN approval.
		The financial provision for mine closure needs to be based on cost calculations. Companies, in conjunction with regulators, need to establish

		an independent fund to provide adequate financial resources to fully implement closure.
		Adequate regulations applicable to mine closure are contained in the relevant legislation.