Memorandum

Subject: **RENEWAL OF THE ENVIRONMENTAL CLEARANCE CERTIFICATE FOR SWAKOP URANIUM (PTY) LTD'S EMULSION MANUFACTURING PLANT AT THE HUSAB MINE:**

ENVIRONMENTAL MANAGEMENT PLAN

Swakop Uranium (Pty) Ltd (Swakop Uranium) holds the mining licence (ML) 171 and Environmental Clearance Certificates (ECCs) for the Husab Uranium Mine (and associated activities / infrastructure) and for its associated linear infrastructure. The mine and processing plant are situated in the northern most part of the Namib Naukluft National Park, about 12 km south-east of Arandis. Mining started in March 2014 and the commissioning of the processing plant commenced in December 2016.

Swakop Uranium's emulsion manufacturing plant mixes relatively inert chemicals (ammonium nitrate and sodium nitrate) and oils (used diesel and machine oil) to produce an emulsified product for use in blasting. The product from the plant is a non-explosive yellowish paste. It was projected that during the initial three years of operation the Husab Mine will require 66 325 t of bulk explosives and 622 568 units of explosives accessories. At peak production the project will consume 52 262 t of bulk and 488 063 units of explosives accessories per annum. Swakop Uranium continues to use the emulsion manufacturing plant as originally described and assessed. No amendments to the plant or associated activities are planned.

An Environmental Clearance Certificate (ECC) was issued by the Ministry of Environment and Tourism (MET) (now the Ministry of Environment, Forestry and Tourism (MEFT) : Department of Environmental Affairs for the operations of the plant in March 2014 and was renewed in September 2017. The ECC is only valid for a period of three years. It is with this background that a renewal application for the ECC is being done.

As part of this renewal application, MEFT (DEA) requested the submission of the original / approved Environmental Management Plan (EMP). It must be noted that the management measures associated with the emulsion manufacturing plant at the mine forms part of the overall "Husab Mine and Associated Linear Infrastructure EMP". The EMP was amended as part of an EIA amendment application process in 2018 and approved by MET in 2019.

The Amended (2018) EMP is herewith attached. This renewal application does not necessitate any further amendments to the EMP.

Amended - 2018

HUSAB MINE AND ASSOCIATED LINEAR INFRASTRUCTURE ENVIRONMENTAL MANAGEMENT PLAN (EMP)

AMENDED -2018

HUSAB MINE AND ASSOCIATED LINEAR INFRASTRUCTURE ENVIRONMENTAL MANAGEMENT PLAN

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1. INTRODUCTION

Swakop Uranium has a mining licence (ML171) and environmental clearances for its Husab mine and its associated linear infrastructure. The mine and processing plant is situated in the northern most part of the Namib Naukluft National Park (NNNP), about 12 km south-east of Arandis. Mining started in March 2014 and the commissioning of the processing plant commenced in December 2016. The regional and local settings of the mine (including the proposed changes to the WRD) are shown in Figures 1-1 and 1-2 respectively.

Swakop Uranium undertook an EIA for the Husab Mine and related site infrastructure in 2009/2010. Another EIA was conducted in 2010/2011 for the linear infrastructure. In 2012/2013 Swakop Uranium undertook an EIA amendment for the proposed changes to the Husab Mine, relating to the mineralised waste facilities. In 2013/2014 an EIA amendment was conducted for a proposed change to the permanent water pipeline alignment (and associated power line) and a further amendment to the linear infrastructure was applied for in 2016, for a proposed new 33 kV overhead powerline at Husab Mine 'B2 Vehicle Staging area'.

The Ministry of Environmental and Tourism (MET): Department of Environmental Affairs (DEA) has issued the following Environmental Clearance Certificates (ECCs) to Swakop Uranium after review and acceptance of the relevant EIAs:

- In January 2011 the ECC for the Husab Mine EIA was issued and then renewed in 2013;
- In June 2011 the ECC for the Linear Infrastructure EIA was issued and also renewed (after the EIA amendment) in 2013;
- In September 2013 the ECC for the Husab Mine EIA Amendment was issued and this ECC was renewed in September 2016;
- In March 2014 MET issued an ECC for the Amendment to the Husab Mine Linear Infrastructure associated with the Water Supply Pipeline and northern associated power line;
- In September 2016, MET issued the ECC for the amendment to the Husab Mine Linear Infrastructure, associated with the new 33 kV overhead powerline.
- In March 2014 issued an ECC for the Emulsion Manufacturing plant (renewed in September 2017);
- In July 2014, an ECC was issued for an increase in Height of the Base Transmitter Mast From The Current 30 Meters to 60 Meters Situated at the Husab Mine (renewed in September 2017); and
- In February 2017 MET issued the ECC for the second Telecommunication Tower at the Husab Mine.

A combined environmental management plan (EMP) for both the Husab Mine and its associate linear infrastructure was compiled and approved as part of the above mentioned environmental clearances.

As a result of the findings of the EIA Amendment process conducted in 2017 / 2018 (relating to the design changes to the WRD, new on-site waste incinerator and six new mobile communication antenna poles along the access road to the mine), new environmental management measures have been identified. Thus the approved Husab Mine and associated linear infrastructure EMP is now been updated (this document) to include all additional/amended management and mitigation measures associated with the proposed changes to the mine. Some of the commitments in the approved EMP are also no longer

applicable or needs amendment due to activities being completed and/or further information that became available since the EMP was drafted, compared to the current situation on site.

The relevant changes/amendments to the approved EMP are highlighted in grey for ease of reference.

There is potential for further development of the mining operation. If this were to occur, the new developments will be covered in a separate EIA process that will assess the cumulative impacts of current and proposed activities. This 2018 Husab EMP document will then be revised to accommodate the management of impacts, both local and cumulative, of the new development.

Swakop Uranium is committed to complying with legal requirements as a minimum, applying best practice where appropriate, and demonstrating active stewardship of land and biodiversity. Swakop Uranium respects the rights of all people and values cultural heritage. This is reflected in the Swakop Uranium sustainability policy and Swakop Uranium's Company Policy, which incorporates Health, Safety, Environment and Quality which are provided in Appendix B.

Figure 1-1: Regional setting

Figure 1-2: Locality Map

2. PURPOSE OF THE HUSAB MINE AND ASSOCIATED LINEAR INFRASTRUCTURE EMP

2.1 Legal Requirements for an EMP

As part of the mining license application process, an EIA Report is submitted to the Ministry of Environment and Tourism (MET). An EMP must also be submitted and approved by the relevant authorities to comply with the EIA Regulations of 6 February 2012, promulgated under section 56 of the Environmental Management Act, 2007 (Act No. 7 of 2007). In addition, Swakop Uranium's Mining License (171) requires that the company enters into an Environmental Contract with both the MET and MME through the provision and acceptance of an environmental management plan report. This EMP has therefore been developed in compliance with these regulations and will form the foundation for environmental impact management to be implemented for the life of the Husab mine and its associated linear infrastructure. All service providers and contractors will be expected to abide by the conditions contained herein.

This EMP contains a series of management plans designed to meet legal requirements and to minimise the negative impacts associated with uranium mining in a national park, in an area of high biodiversity and tourism. It also covers the construction of roads, power and pipelines during all construction, operations and closure phases.

The environmental clearance certificates that were issued by the MET for the mine and linear infrastructure EIAs and EMPs included only one condition relating to stakeholder engagement, and this has been addressed in this EMP. Various environmental permits are required for the project. These permits are listed in section 2.5 of this EMP. Any further conditions that MET might have on the EIA Amendment Report will also be incorporated into this EMP.

2.2 How this EMP will be used

The commitments contained in this EMP will, once an environmental clearance has been obtained for the EIA Amendment (2018), be Swakop Uranium's 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 herein.

Given the phased nature of the construction and development of a new mine and processing plant, plus its associated mineral waste facilities and linear infrastructure, different groups of activities occur at different phases of the project (Table 6-1 to Table 6-3) and subsequent mining operations, before closure.

Swakop Uranium will develop internal procedures as part of their integrated health, safety, environmental and quality system to ensure all requirements spelled out in this EMP are being implemented.

~~Swakop Uranium has therefore developed additional construction focussed EMPs from this overarching EMP that contain detailed action plans relevant to the specific groups for whom it is intended. Swakop Uranium will also develop a other focussed EMPs from this overarching EMP relating to early mining and then for operations. The EMP hierarchy is summarised in Figure 2-1 below and is described in the sections below.~~

~~The construction phase EMPs are based on this overarching EMP and include specific requirements from relevant environmental authorisations and permits. They will be updated as and when required (i.e. when additional authorisation/permits are required). An EMP to cover all operational activities will be produced during the construction phase, prior to the commissioning of the plant.~~

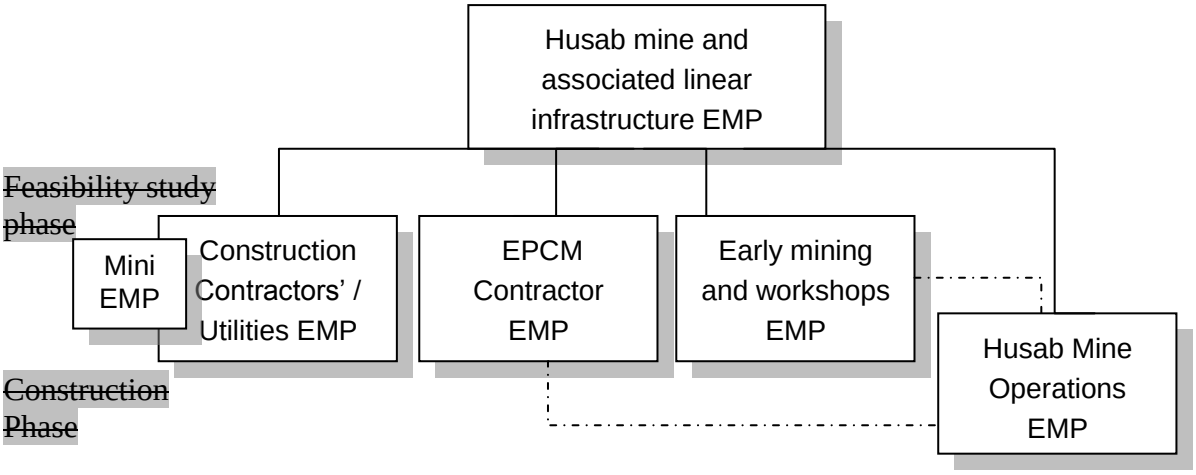

Figure 2-1: EMP Hierarchy Diagram

2.2.1 Construction Contractors' EMP

Swakop Uranium developed an **EMP for Construction Contractors** and Utilities Providers, which provides the environmental management philosophy and information on the environmental and other related management systems that are being put in place by Swakop Uranium and the engineering procurement construction and management (EPCM) contactor for the construction phase. All contractors and their sub-contractors will be required to adhere to this Construction Contractor's EMP.

The content of these EMPs address, for example, the waste management philosophy and recycle streams, or concrete batch plant process that will exist on site and along linear routes. Also, the Contractor's and/or Linear Construction EMP contain reference to project specifications for the construction and management of, for example, wash bays, oil traps, bunding for hazardous substance and hydrocarbons etc. Minimum requirements for infrastructure such as wash bays, oil traps and bunding have been included in this EMP which are in line with the project specifications (refer to section 11).

The Contractors and/or Linear Construction EMP, developed from the main Husab EMP, forms part of the request for tender documents issued to prospective contractors. Swakop Uranium and/or the EPCM contractor adjudicate tenders with environmental criteria in mind. Each contractor is also required to develop, once appointed, a Mini EMP related to, for example, their specific work requirements, work areas, number of employees and materials to be used etc. This Mini EMP has to be sanctioned by the environmental department prior the start of work.

NamWater and NamPower will be guided by the Linear Construction EMP, but will also apply their own internal standard project requirements.

2.2.2 EPCM EMP

Swakop Uranium has also developed an **EMP for the EPCM contactor** that focuses on the management and monitoring systems required to enable adherence to the overarching EMP commitments during the construction phase of the project. For example, the waste management philosophy and system that the EPCM contractor is required to implement and communicate. Another example is the requirement for auditing of compliance of the overarching, and other, EMPs. Monitoring programmes and reference to procedures, data collection and validation, data interpretation etc. were included in this EMP.

~~2.2.3 Early Mining EMP~~

~~A third **early mining EMP** will be prepared for the preparatory mining operations that will commence during the construction phase in the second 2014, to ensure that this work is conducted in accordance with the recommendations of the overarching EIA.~~

2.3 Induction and Environmental Awareness Training

~~All persons who work or visit the Husab site will be required to undergo induction. Different induction programmes have been, and will be developed for managers, employees, contractors and visitors. The environmental management plans in section 7 highlight the areas where training is required. The existing exploration induction programme has also been updated. The induction and training programmes will also be modified as the ore is exposed in the pits and the risk of exposure to radiation increases.~~

All persons who work or visit the Husab site and/or Exploration areas are required to undergo induction. Different induction programmes have been developed for managers, employees, contractors and visitors. The induction material is continuously reviewed to ensure its relevance. The environmental management plans in Section 7 highlight the areas where training is required. Environmental specific training/communication formats are in place. The induction and training programmes will also be modified during the different operational phases and the risk of exposure to radiation increases.

2.3.1 Auditing EMP Compliance

The EMP contained in this document can be audited very easily by asking a simple question. *Has Swakop Uranium met the commitment?* Yes or no answers should provide sufficient information on the degree of Swakop Uranium's adherence to the EMP. An example compliance checklist has been developed and is included in Appendix D.

2.3.2 Integrated Management System

The specific requirements of this EMP are incorporated into an Integrated (Health, Safety, Environmental and Quality) Management System (IMS) that is being developed by Swakop Uranium, as per the requirements of ISO 9001, ISO 14001, OSHAS 18001 and NOSA. ~~During the construction phase, the EMS will be further developed for the operations phase to the requirements of ISO 14001~~.

This will include the development of standards and operating procedures for construction and operation e.g. requirements for bunding, topsoil management, spill handling, monitoring etc.

2.4 Environmental Issues and Management Plans

The table below provides a high level list of the main environmental issues identified during the various EIA processes conducted for the mine and plant and associated waste rock dump (WRD) and tailings storage facility (TSF), incinerator, workshops, etc. as well as power lines, pipelines and access road construction. Management plans have been developed to address these issues and are listed below. The detailed management plans are all described in section 7.

Table 2-1: Summary of Issues Identified in EIAs with Relevant Management Plans

Environmental component	Issue	Relevant Management Plan/Procedure
Topography	Hazardous excavations and infrastructure	Stakeholder consultation Safety and security Linear infrastructure
Soil and land capability	Loss of soil resources from pollution	Soil Waste management Linear infrastructure
	Loss of soil resources from physical disturbance	Soil Linear infrastructure
Biodiversity – natural vegetation and animal life	Physical destruction of biodiversity	Biodiversity Linear infrastructure
	General disturbance of biodiversity	Biodiversity Soil Waste management Linear infrastructure
Surface water	Altering drainage patterns	Surface water Linear infrastructure
	Pollution of surface water	Surface water Waste management Linear infrastructure
Groundwater	Dewatering	Groundwater
	Contamination of groundwater	Groundwater Waste management Linear infrastructure
Air quality	Air pollution	Air quality Linear infrastructure
Noise	Noise pollution	Noise Linear infrastructure
Archaeology	Damage to archaeological resources and landscapes	Archaeology Linear infrastructure
Visual	Visual impact	Visual Linear infrastructure
Socio-economic	Economic impact	Socio-economic Stakeholder consultation Linear infrastructure
	Road use and traffic impacts	
	Inward migration	
	Social links - mine and community	
Radiological	Direct exposure to radiation from on-site sources	Radiological Safety and security
	Aquatic and atmospheric pathways	
	Secondary pathways	

2.5 Environmental Permits/Certificates/authorisations

Swakop Uranium will need to acquire/has acquired a number of environmental related permits, certificates and authorisations relating to both the construction and operations phases. A list of these permits/certificates/authorisations is provided in Table 2-2. Some have already been secured to date, others need to be renewed, and still others must be applied for.

Table 2-2: List of permits/certificates/authorisations that are required by the Husab mine

Aspect	Permits/Certificates/Authorizations	Regulator
Exploration License	Exploration license	MME
	Environmental Clearance for EPL3439	MET
	Environmental Clearance for EPL3138	MET
Mining License	Mining License (ML 171)	MME
	Environmental clearance certificates for Husab mine and associated activities	MET
	Environmental clearance for Linear Infrastructure	MET
	Accessory Works Plan - Approval construct/alter infrastructure	MME
Fuel & Energy	Consumer installation certificate - Diesel storage ~~(Ida and Husab camps)~~	MME
	License for Electricity Generation	ECB
Water	Water Abstraction (Swakop River) Permit	MAWF - DWA
	~~Water Abstraction (EPL) Permit~~ Pit Dewatering Permit	MAWF - DWA
	~~Namwater - Omdel abstraction (Water use) Permit~~	MAWF-DWA
	Drilling of Boreholes	MAWF - DWA
Waste	Wastewater and effluent disposal exemption permit	MAWF - DWA
	Disposal of drilling waste - Approval (Husab Mine and Exploration)	MET (MHSS)
National Park	Entry Permit to Game Park/Reserve Naukluft (Employees, Contractors, Visitors)	MET - DWNP
	Construction campsite - Permit to reside in a Park	MET - DWNP
	Permit to travel after Sunset/Sunrise	MET - DWNP
	Exploration campsites (Ida and Husab) (Part of ECC)	MET
Vegetation	Research collecting - Welwitschia	MET
	Research collecting - Other plants	MET
	Forest permit-Tree harvesting - Protected trees	MAWF - DF
	CITES export permit (as required)	MET
Radioactive materials	Transport of radioactive materials	MHSS - NRPA
	Authorisation for the possession and use of devices generating ionizing radiation	MHSS - NRPA
Archaeological	Heritage permit/ to disturb and transport archaeological materials	NHC

3. LEGAL FRAMEWORK

Table 3-1 provides a register of legislation relevant to uranium mining in Namibia.

Table 3-1: Summary of Relevant Namibian and Other Legislation

Year	Name of law, regulation or policy
Namibian Legislation	
1990	The Constitution of the Republic of Namibia of 1990
1992	The Labour Act 6 of 1992
1992	Minerals Act, 33 of 1992
1997	Regulations relating to the Health & 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)
1997	Namibian Water Corporation Act, 12 of 1997
1998	The Health Act 21 of 1988
1992	The Minerals (Prospecting and Mining) Act 13 of 1990
1990	Petroleum Products and Energy Act 13 of 1990, as amended
1999	Road Traffic and Transport Act 22 of 1999
2000	Petroleum Products regulations
2000	Electricity Act 2 of 2000
2001	The Forest Act 12 of 2001
2001	Environmental Investment Fund of Namibia Act ,13 of 2001
2004	Water Resources Management Act of 2004
2004	National Heritage Act 27 of 2004
2005	Atomic Energy and Radiation Protection Act 5 of 2005 and the Radiation Protection and Waste Disposal Regulations of 18 November 2011
2007	Environmental Management, Act 7 of 2007 and the Environmental Impact Assessment Regulations of 6 February 2012
2013	Water Resources Management Act 11 of 2013
Former SA and SWA legislation still applicable to Namibia	
1919	Public Health Act 36 of 1919
1956	Water Act 54 of 1956
1956	Explosives Act 26 of 1956
	Regulations promulgated in terms of the Explosives Act 26 of 1956
1969	Soil Conservation Act 76 of 1969
1974	Hazardous Substances Ordinance 14 of 1974
1975	Nature Conservation Ordinance 14 of 1975
1976	Atmospheric Pollution Prevention Ordinance 11 of 1976
	Namib Naukluft National Park Rules
Namibian policy	
1994	Policy for the Conservation of Biotic Diversity and Habitat Protection
1995	Namibia's Environmental Assessment Policy for Sustainable Development and Environmental Conservation
1998	Draft White Paper on the Energy Policy of Namibia
1999	Policy for Prospecting and Mining in Protected Areas and National Monuments
2000	National Water Policy White Paper
2004	Minerals Policy for Namibia
Pending Namibian legislation	
1999	Draft Pollution Control and Waste Management Bill
2000	Draft Road Traffic and transport Regulations
2009	Parks and Wildlife Management Bill
2013	Water Resources Management Act 11 of 2013 Regulations
International conventions	
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 Transboundary 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 Janiero Convention on Biological Diversity
1992	United Nations Framework Convention on Climate Change
1997	Southern African Development Community (SADC): Protocol on Mining

4. OVERALL ENVIRONMENTAL OBJECTIVES FOR THE PROJECT

The following overall environmental objectives have been set for the Husab mine and its associated linear infrastructure. These are guided by Swakop Uranium's Company Policy (see Section 1). ~~Sustainability Policy, and the EPCM contractors HSEC Policy for the construction phase of the project contained in Appendix B:~~

- To comply with national legislation and standards for the protection of the environment.
- To comply with the Equator Principles.
- To comply with corporate sustainable development policies and objectives.
- To limit potential impacts on biodiversity through the minimisation of the footprint and the conservation of residual habitat within the mine area.
- To investigate and exploit measures to reduce resource and energy consumption.
- To keep surrounding communities informed of mining activities through the implementation of forums for communication and constructive dialogue.
- To limit contaminated effluent discharge into the environment through the containment, recycling or removal of contaminated water.
- To conserve soil resources by stripping, stockpiling and managing topsoil.
- 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, management, temporary storage and removal of waste.
- To reduce the potential for dust emissions through the implementation of dust control measures.
- To reduce the potential for noise disturbance in surrounding areas.
- To protect cultural heritage by avoiding sites of significance, or, if this cannot be done, to ensure thorough documentation thereof prior to destruction.
- To undertake rehabilitation wherever possible during the life of the mine.
- To incorporate final closure objectives in construction and mine planning.
- To develop, implement and manage monitoring systems to ensure good environmental performance: ground and surface water, radiation, air quality, biodiversity and noise.
- To ensure the health and safety of surrounding communities through access control and monitoring of health criteria.
- To support and encourage environmental awareness and responsibility amongst all employees and service providers.
- To provide appropriate environmental education and training for all employees and service providers.
- Prevent and minimise pollution.
- Ensure compliance to the EMP.

The Equator Principles to which Swakop Uranium is committed are presented in Table 4-1.

Table 4-1: Relevant Equator Principles

High level description of Principles	Comments in relation to the Husab mine and associated linear infrastructure
Equator Principle 1: Review and Categorisation	
All projects are categorised based on the magnitude of their potential environmental and social risks and impacts. Category A projects have potential significant adverse social or environmental impacts that are diverse, irreversible, or unprecedented. Category B projects have limited adverse social or environmental impacts, which are site-specific and largely reversible, while Category C projects have minimal social or environmental impacts.	The Husab mine and associated linear infrastructure is a category A project.
Equator Principle 2: Social and Environmental Assessment	
A social and environmental impact assessment (SEIA) process, relevant to the nature and scale of the project, must be undertaken to address the potential social environmental risks and impacts of the project, incorporating specialist studies where necessary. The assessment is also required to propose relevant mitigation and management measures.	The various EIA and EMP reports address most of the related issues as set out in Exhibit ii of Principle 2. Some aspects not covered in the various EIA and EMP reports will be covered as part of ongoing environmental, health, safety and social management.
Equator Principle 3: Applicable Social and Environmental Standards	
For projects located in non-OECD (Organisation for Economic Co-operation and Development) countries, the assessment will refer to the International Finance Corporation (IFC) Performance Standards (1-8) and the applicable industry-specific Environment, Health and Safety Guidelines. The performance standards address Social and Environmental Assessment and Management Systems, Labour and Working Conditions, Pollution Prevention and Abatement, Community Health, Safety and Security, Land Acquisition and Involuntary Resettlement, Biodiversity Conservation and Sustainable Natural Resource Management, Indigenous Peoples and Cultural Heritage. The relevant EHS Guidelines include: General EHS Guidelines (environment, occupational health and safety, community health and safety, decommissioning and closure) and EHS Guidelines for Mining. The SEIA must also address compliance with relevant host country laws, regulations, and permits that pertain to social and environmental matters.	While the various EIA and EMP reports cover many of the applicable aspects of these performance standards, some will be covered through the on-site management systems and procedures currently being developed.
Equator Principle 4: Action Plan and Management System	
An action plan, the level of which must be appropriate to the nature and scale of the project, which describes and prioritises the actions needed to implement the mitigation measures, corrective action and monitoring measures necessary to manage the social and environmental risks and impacts identified in the SEIA must be compiled. A social and environmental management system must be established and maintained to implement the action plan and corrective actions required to comply with host country laws and regulations as well as the requirements of the IFC performance standards and guidelines.	The management recommendations in the various EIAs and the plans in the EMP will be integrated into a formal on-site management system.

High level description of Principles	Comments in relation to the Husab mine and associated linear infrastructure
Equator Principle 5: Consultation and Disclosure	
Projects which may have a significant adverse impact on local communities are required to undertake a consultation process. The consultation process must ensure the community's free, prior, and informed consultation, and it must be demonstrated that the project has adequately incorporated the community's concerns.	A comprehensive disclosure and consultation process was followed as part of the various EIA processes.
Equator Principle 6: Grievance Mechanism	
Consultation, disclosure and community engagement must continue through the construction and operational phases of a project. A grievance mechanism must be established as part of the management system in order to receive and facilitate the resolution of concerns and grievances raised by those affected by the project. The affected communities must be informed about the grievance mechanism process, which must address all concerns promptly and transparently, in a culturally appropriate manner, and must be accessible to all community members.	Objectives and actions in this regard have been included in the various EIA and EMP reports.
Equator Principle 7: Independent Review	
Equator Principle compliance of the SEIA, action plan and public consultation process must be assessed by an independent social or environmental expert, who is not directly related to the borrower, on behalf of the lending institution.	The various EIA and EMP reports are reviewed by independent experts.
Equator Principle 8: Covenants	
Covenants must be incorporated into the financing documentation whereby the borrower is committed to comply with relevant host country environmental legal requirements, comply with the action plan, to provide periodic reports as required by the financial institution to document compliance with the action plan and host country environmental and social laws, regulations and permits, and to decommission the facilities in accordance with an agreed decommissioning plan.	Swakop Uranium is committed to these covenants.
Equator Principle 9: Independent Monitoring and Reporting	
The project is required to appoint an independent environmental and/or social expert, or to retain qualified and experienced external experts to verify monitoring information which is reported to the financial institution.	Swakop Uranium will implement this as required.
Equator Principle 10	
Financial institutions which are signatories to the Equator Principles are required to report publically at least annually about their Equator Principle implementation processes and experience. The reports typically include, as a minimum, the number of EP transactions, project categorisation, and the implementation process.	This principle is relevant to financial institutions (banks) which are signatories to the Equator Principles.

5. SCOPE OF THE EMP

The Namibian the EIA Regulations of 6 February 2012, promulgated under section 56 of the Environmental Management Act, 2007 (Act No. 7 of 2007), require that an Environmental Management Plan must accompany an Environmental Report. In addition, the Mining Licence requires an EMP report to be submitted and accepted for the Environmental Contract with the proponent and the MME and MET. The general requirements for an EMP are tabled below, with a reference to where the information is provided in this document.

Table 5-1: General Requirements for the Content of the EMP

General EMP requirements	**Reference in the EMP**
Details of the persons who prepared the EMP and the expertise of those persons to prepare an environmental management plan.	Appendix A
Information on any proposed management or mitigation measures to address the environmental impacts that have been identified in a report contemplated by these regulations, including environmental impacts or objectives in respect of – i. Planning and design. ii. Pre-construction and construction activities. iii. Operation or undertaking of the activity. iv. Rehabilitation of the environment. v. Closure, where relevant.	Sections 7.1 to 7.14
A detailed description of the aspects of the activity that are covered by the EMP.	Sections 6 and 7.2 to 7.14
An identification of the persons to be responsible for the implementation of the mitigation measures.	Section 8
Where appropriate, time frames within which the measures contemplated in the EMP must be implemented.	Section 7
Proposed mechanisms for monitoring compliance with the EMP and reporting on it.	Section 10

6. PROJECT OVERVIEW

6.1 Construction Phase

The construction phase was completed in 2018 for the approved components of the mine. Limited construction activities are foreseen for the proposed (2018) amendments. However, all construction related descriptions and management and mitigation commitments are kept in this EMP to ensure compliance when minor construction actives associated with the amendments are conducted; as well as for any possible future expansions / amendments to the Husab mine / process plant and associated construction activities.

The construction phase infrastructure, services and activities are summarised in the Table 6-1 below.

6.2 Operational Phase

Mining started in March 2014 and the commissioning of the processing plant commenced in December 2016. The open pit life is estimated at ±22 years based on the prevailing uranium price, plus one year of stockpile treatment. Decommissioning of the plant will occur in 2037~~5~~. The operational phase infrastructure, services and activities are summarised in Table 6-2 below.

6.3 Decommissioning and Closure

At a conceptual level, decommissioning can be considered a reverse of the construction phase, with the demolition and removal activities of the majority of the infrastructure and being very similar in impact to those described with respect to the construction phase. The closure phase is the stage after the cessation of all mining and processing activities and site rehabilitation of the site. Relevant activities are those related to the after care and maintenance of remaining structures. The decommissioning and closure phase objectives and activities are summarised in the Table 6-3 below.

Table 6-1: Summary of Construction Phase Infrastructure, Services and Activities

Construction Infrastructure and Services	Construction Activities
Main Mine Contractors Camp: Temporary facility (required for approx. 36 months). House approximately 4 000 occupants during peak construction periods. Prefabricated and/or containers. Recreational facilities provided. Fenced and with access control. Prior to commissioning of the sewage treatment plant, there will be prefabricated portable toilets and showers units with septic tanks. Modular permanent sewage treatment plant to be built during early construction phase. Potable water from the temporary NamWater pipeline from Rössing reservoir. Power provided by NamPower. General waste and hazardous non-mineralised waste will be trucked off site and disposed of at the permitted waste sites at Swakopmund and Walvis Bay respectively. Workshop and maintenance areas. Stores for storing and handling chemicals solvents, paints and other construction materials. Central fuel depot. Concrete batch plant(s). Contractors lay-down areas. Mobile site offices. Early mining: Permanent offices, workshops, operator's lunchroom, laydown areas.	Earthworks: drilling and blasting; cleaning and grubbing and bulldozing; soil excavation; stockpiling of topsoil and other material. Treatment and / or disposal of contaminated soil. Opening and management of borrow pits. Excavation of backfill material from borrow pits. Clearing of areas for construction and use of new access roads. Civil works: foundation excavations; building activities. Storage and handling of material: and, rock, cement, chemical additives for cements (leach tanks only). Water utilization – dust suppression, concrete manufacture and curing, flushing of pipes, ablutions etc. Mixing of concrete (batch plant) and concrete work (casting). Operation and movement of construction vehicles and machinery. Refuelling of equipment. Use of cranes. Erection and destruction of scaffolding. Installation of re-enforcement steel. Handling, storage and disposal of hazardous waste. Blasting media packing material. Empty paint containers. Cements bags. Chemical additives (for cement) containers. Contaminated personal protective equipment (PPE) and other (with oil, uranium, etc). Redundant concrete.

Construction Infrastructure and Services	Construction Activities
Explosive magazines and bulk explosives manufacturing plant. Waste collection and storage areas. Service bay in the ROM pad area during construction Wash bay for washing equipment and vehicles. Parking area for cars and equipment. Change houses. Ablution facilities. Temporary power and water supply infrastructure. Cell phone mast. ~~Linear Infrastructure Contractors Camps:~~ ~~Temporary camps that move as construction progresses, however there will be some permanent camps.~~ ~~Workshop and maintenance areas~~ ~~Stores for storing and handling fuel, lubricants, solvents, paints and construction materials.~~ ~~Lay-down areas.~~ ~~Mobile site offices.~~ ~~Waste collection and storage areas.~~ ~~Temporary wash bay for washing equipment and vehicles.~~ ~~Parking area for cars and equipment.~~ ~~Mobile change rooms.~~ ~~Portable toilets that will be serviced regularly.~~ **Water**: Demand: 1,2 million m^3 per annum (pa) for approximately two years	Handling, storage and disposal of non-hazardous waste. Steel off-cuts. Domestic waste. Wood off-cuts. Grinding wheels. Other construction waste. Transportation of hazardous material. Transportation of non-hazardous material. Handling, storage and use of hazardous material. Blasting media. Paints. Gas (welding). Cement. Chemical additives for cement. Installation of pipelines for water and process solutions. Installation of electricity lines. Use of electricity generators. Install transformers. Construct truck parking bays. Manage construction site. Painting, grinding and welding. Provision and operation of water washing and toilet facilities. Slope stabilization and erosion control. Appointment of contractors, labourers, etc.

Construction Infrastructure and Services	Construction Activities
~~Potable water to be supplied by NamWater via a temporary overland pipeline from the Rössing reservoir through the Khan River valley.~~ ~~Additional temporary water may be sourced from boreholes in the Swakop River via overland HDPE pipe.~~ **Power:** ~~Demand: 1 MW for approximately two years.~~ ~~Temporary power for the construction phase will be supplied by NamPower via a power line across the Khan River valley.~~ Back-up power for the contractor's camp will be supplied by 2MVA portable generators. **Sanitation:** ~~Portable toilets with associated septic tanks will be used until the modular sewage treatment plant is built and commissioned.~~ Modular sewage treatment plant will service 4 000 construction workers; sludge will be dried and either disposed of in the WRD or used for bio-remediation; effluent to be used for dust suppression until plant constructed. **Site access:** Temporary access gravel roads from the C28. Permanent access from the B2 across the Khan River.	**Waste management:** Recyclable waste and hazardous non-mineralised waste will be trucked off site and disposed of at the permitted waste sites at Swakopmund and Walvis Bay respectively. Non-hazardous and non-contaminated construction rubble and other inert wastes will be disposed of in an area in the waste rock dump footprint. Waste management plan to be implemented (Section 7.10).

Table 6-2: Summary of Operational Phase Infrastructure, Services and Activities

Operational Infrastructure and Services	Operational Activities
Two open pits – Zone 1 and Zone 2 pits. On site roads. Primary crusher (situated in the run of mine (ROM) complex). Ore stockpiles (coarse ore stockpile at the plant, ROM stockpile near the primary crusher, high-, medium and low grade stockpiles south-west of the ROM complex). Process plant. Acid plant (at the plant complex). Reagents storage Waste Rock Dump (WRD). Tailings Storage facility (TSF). Explosives magazine. On site water supply infrastructure. Stormwater management facilities. Clean and dirty water holding facilities. Emulsion Manufacturing Plant. Sewage treatment plant and septic/conservancy tanks. Reverse osmosis plant for demineralised water (plant complex). Conveyors (in the plant and between the plant and ROM complex). Soil stockpiles. Workshops (plant and mine complexes). Stores (plant and mine complexes). Salvage yard and temporary non mineralised waste handling facilities, including a temporary hazardous materials storage area. A decontamination facility near the process plant. A bioremediation facility	**Mining:** Open pit mining for uranium from two pits (Zone 1 pit: 3 km long, 1.1 km wide and 410 m deep; Zone 2 pit: 1.9 km long, 1.4 km wide and 390 m deep). The pits will initially be developed around smaller, higher value ore areas. Bulk (waste) mining using 300 tonne trucks and shovels with 15 m benches: ore will be predominately mined using smaller face shovels on 7,5 m high benches. The stripping ratio of waste rock to ore will be 6.2:1. Total mineable reserve - 280 million tonnes (Mt) of ore (at an average uranium content of 513 parts per million (ppm). At full production, approximately 145 Mt of total material on average (waste rock and ore) will be mined per annum. At the end of open pit life, 36 Mt of low grade stockpiled ore will be processed. The life of mine is approximately 22 years, depending upon the price of uranium. Ore will be hauled out of the pit via a trolley assist system (a haulage system whereby diesel electric trucks are provided with electrical power directly from an overhead line in the same manner as a city tram). **Pit Dewatering:** Little in pit water is anticipated. Any water ingress will be collected via isolated in-pit sumps and collected for dust suppression purposes.

Operational Infrastructure and Services	Operational Activities
Incinerator Communication infrastructure (including two (2) telecommunication towers and six (6) mobile communication antenna-poles for mobile communication road coverage along the access road to the mine from the B2 turn off) Lighting infrastructure. Helipad (visitors centre/gate house). Visitors centre (gate house). Change houses (Administration complex). Administration offices (Administration complex). Parking areas. Refuelling areas (Mine and ROM complex, contractors lay down area). Loading and off-loading areas (Mine complex). Weighbridges (South of plant complex). Medical facilities (Miningcomplex). Security infrastructure. Laboratory (Administration complex and at the plant complex). On site power infrastructure. **Fencing:** Mine infrastructure footprint to be fenced with same fencing as the park boundary. Plant and mine complexes to have high security fencing and access control. There will be a control point on the access road from the Khan River Valley **Water:** Requirement: 8 Mm^3/a at the start of plant commissioning. Water provided by NamWater via the permanent water supply pipeline.	**Mineral processing:** Plant throughput will be 15 Mtpa. Final product: 6200 – 6500 t/pa U308 produced (Nameplate) ~~8 000 tpa of product produced (70% contained uranium).~~ Process outlined in process flow diagram – refer to Figure 6-3. **Mineralised waste:** <u>Waste rock</u> The waste rock from the pit will be transported by large mining haul trucks and / or trolley assist to the waste rock dump (WRD). The waste rock dump will be formed by placing rock in ±30m high lifts. Benches will be formed around the outside of the final dump at ±30m vertical intervals. Toe paddocks, collecting runoff water, will be constructed around the WRD. <u>Tailings</u> Wet tailings from the process plant will be deposited by pipeline onto a synthetically lined standalone tailing storage facility (TSF). The tailings volume will be approximately 186 million m^3 over the mine life. The tailings facility will be lined using a composite liner comprising 1mm HDPE underlain by a 250mm layer of selected fine-grained compacted fill. **Waste management:** Incineration of the following waste types: • Radioactive contaminated waste • Hydrocarbon contaminated waste

Operational Infrastructure and Services	Operational Activities
NamWater will provide potable quality raw water (desalinated). A portion will be set aside as fire water reserve. **Power:** Requirement: power demand peaks at 133 MW. Power will be supplied by NamPower via a permanent power line from the new Lithops sub-station near the existing 220kV line north of the Khan River. 33 kV overhead powerline at Husab Mine 'B2 Vehicle Staging area'. **Sanitation:** A modular sewage treatment plant will be constructed during the construction phase and will be used for sewerage treatment during the operational phase. Also septic/conservancy tanks in areas located too far from the STP. **Housing:** Employees will be housed in nearby towns – home ownership encouraged. Transport to site will be facilitated from Swakopmund and Arandis.	• General Waste • Reagents containers/storage waste Alternatively, the recyclable waste and hazardous non-mineralised waste will be sorted and managed by a contractor, and trucked off site and disposed of at the permitted waste sites at Swakopmund and Walvis Bay respectively. Cement and cement additives will be stored and mixed on impermeable covers. Concrete will not be mixed directly on the ground. Emptied cement bags will be stored in weatherproof containers and disposed of regularly and will not be used for any other purpose. All excess cement will be collected from the batching plant on a regular basis and disposed of in a designated area in the waste rock dump or at a dedicated (designed) area that is impermeable. ~~All excess cement will be collected from the batching plant on a regular basis and disposed of in a designated area in the waste rock dump or at a dedicated (designed) area that is impermeable. Non-hazardous and non-contaminated construction rubble and other inert wastes will be disposed of in an area in the waste rock dump footprint.~~ Empty sulphur bags will be disposed of in a dedicated area in the waste rock dump footprint, if not incinerated. Waste management plan to be implemented (section 7.10). **Water management:** Clean water will be diverted around mine infrastructure Linear infrastructure such as roads will be constructed to accommodate the flow of water in watercourses Contaminated water, including runoff, will be contained and reused. Clean and dirty water will be separated throughout the site. The mine aims to limit contaminated effluent discharge into the environment through the containment, recycling or removal of

Operational Infrastructure and Services	Operational Activities
	contaminated water.

Table 6-3: Decommissioning and Closure Phase Objectives and Activities

Closure objectives
Closure objectives have been developed for the Husab mine and associated linear infrastructure against the background of the project's location in the Namib Desert, within the NNNP, and immediately adjacent to world famous Welwitschia plains and between two major ephemeral rivers, the Khan and Swakop Rivers. The following closure objectives have been set: • Disturbed areas other than those comprising the open pit and mineralised waste facilities will be returned to as close to their original (and functional) state as practical. • Permanent visible features such as the mineralised waste facilities and related environmental bunds as well as safety berms around the open pit will be left in a form that blends with the surrounds. • Contamination beyond the mine site by wind, surface runoff or groundwater movement will be prevented through appropriate erosion resistant covers, containment bunds and drainage to the open pit. • Linear infrastructure comprising roads, railways, pipelines, power lines, conveyors and related components will be removed and the disturbed land rehabilitated to blend with the surrounding natural environment. • Socio-economic impacts (including the loss of employment) will be minimised through careful planning and preparation for closure beginning three to five years before closure takes place. • The surface of the TSF will require a specific capping in order to prevent post closure dust emissions, water erosion and water ingress. Furthermore, active seepage collection will be required so that the collected seepage can be directed to the open pit(s). The above principles and concepts will be refined as part of ongoing detailed closure planning and costing during the life of mine.
Closure Planning
Swakop Uranium will keep current with Namibian legislation requirements concerning closure planning and the provision of funding for closure. The closure plan will be reviewed regularly, and managed funds will be developed to meet the requirements of the revised closure plan. This will include provision for the long term monitoring and active management of the tailings storage facility. Throughout construction and the LOM resources will be made available for studies into rehabilitation and restoration of the mine and its associated linear infrastructure.

Closure Activities
The conceptual decommissioning plan is as follows: • Surface infrastructure will be demolished and removed, with the exception of the mineralised waste facilities which will remain in perpetuity. The open pits will also remain in perpetuity. • Areas where infrastructure has been removed will be levelled and restored in terms of soils horizons, vegetation and drainage. **Open pit decommissioning** • An exclusion bund will be constructed around the northern, western and southern rims of the open pit and connect to the mineralised waste facilities which will form the eastern exclusion bund. • Seepage water and all other contaminated water that can drain naturally to the open pit will be directed to the pit where it will evaporate. • Access ramps to the open pit will be bunded off to prevent access down the ramps. • The top berm of the pit will be sloped to an angle of approximately 20 degrees. • Pit slopes will be assessed and stabilised for long term stability performance. **WRD decommissioning:** • The WRD will be shaped as far as is reasonably possible, to a landform that blends with the surroundings as part of concurrent rehabilitation and in accordance with visual impact mitigation measures. • Runoff and eroded material from the ~~northern, eastern and southern~~ WRD surface will be captured behind a series of perimeter toe paddocks and will be allowed to evaporate. ~~Any excess water that is not captured during intense storm events will be routed towards the south and then around the southern end of the WRD into the zone 2 pit. Along the western perimeter the runoff and eroded material will be routed directly to the Zone 2 open pit without any retention in perimeter paddocks.~~ • ~~Seepage from the toe of the WRD is expected to be non-existent or minimal, and if it does occur it will be captured by a peripheral toe channel and subsequently directed to the Zone 2 open pit.~~ • Aftercare and maintenance will be designed and implemented for the post closure phase. • Surface and groundwater quality will be monitored regularly for a period to be agreed upon with the relevant authorities.

Closure Activities
TSF decommissioning • During the life of the TSF, a side slope cover system will have been placed and there will be no requirement for further decommissioning works on the side slopes. The side slope cover consists of a well-graded inert waste rock layer placed against the tailings side slope surface that is, in turn, overlain by a layer of inert, durable rip-rap. The rip-rap is present to minimise run-off erosion of the underlying waste rock layer. • Run-off from the side slopes of the TSF is expected to be of good quality in geochemical terms since the side slope cover materials will consists of inert (NAF) materials. Furthermore, the clean rip-rap cover will not yield erosion solids and therefore run-off will not have any significant degree of suspended solids. For these reasons, it is anticipated that the run-off can be discharged directly to the environment. Notwithstanding this, during the early stages of the closure period, the run-off will be directed to the TSF PCD and its quality will be monitored. If the quality is not sufficient for direct discharge, then it will be actively managed by transporting it either by i) collection and transport (via tankers or pumping) to the Zone 2 pit or ii) treatment and discharge. • ~~At closure, the upper surface of the TSF will be covered with a 2.5 1m thick cap of overburden soils and/or well-graded inert waste rock.~~ • During operations, a 2.5m thick cladding of graded rock and rip-rap will be placed on the side slopes of the TSF as part of concurrent rehabilitation efforts. • At mine closure, a 1m thick cover of selected material (graded rock and/or soil) will be placed on the upper surface of the TSF. • The upper surface of the tailings, and therefore the cap, will dip gently towards the former decant pond area. There will not be a high risk of run-off erosion of the top surface cover given the gentle slope inclination. • While rainfall run-off erosion is not anticipated to be a long term problem, settlement of the cap will be monitored in the post-closure phase and once run-off pattern has developed, coarse material will be placed to ensure that run-off routes are protected from erosion. • Run-off from the cap will collect at the low point of the upper TSF surface (at the location of the former tailings pond). In this area, a layer of coarse rockfill will be provided to allow storage of run-off within the pore space of the rockfill and cap. Infiltration into the underlying tailings will be minimal because the tailings in the former pond area have a very low permeability and the stored water will be evaporated from the soil / rockfill system during the prolonged dry periods following run-off events. The coarse rockfill is present to prevent animals from being attracted to any temporary accumulation of run-off water. • The risk of wind erosion of the capping soils will be addressed by the provision of windrows on the soil cap. • Once tailings deposition has ceased the phreatic surface within the deposited tailings will gradually reduce as part of the natural draw-down process. Drawdown will result in ongoing seepage from the seepage collector drains that are present on top of the basal lining system. This seepage will be collected by the TSF downstream toe collector system and will be directed to the lined seepage collector pond located on the south-western corner of the TSF. This seepage will be actively managed by either by i) collection and transport (via tankers or pumping) to the Zone 2 pit or ii) treatment and discharge. Once the draw-down process is complete, seepage will reduce to zero and no further active management is anticipated. • During operation and after closure of the dam, monitoring will be undertaken and if contamination in the deep aquifer and/or near surface

Closure Activities
water is detected active management will be undertaken for as long as there is a contamination concern. **Process plant, incinerator, primary crusher and conveyor:** The processing plant, incinerator, primary crusher and conveyors will all be dismantled, and salvageable elements will be de-contaminated and sold. The remainder of the processing plant including steelwork, concrete, liners, brickwork etc. will be dismantled or broken up and disposed of into the open pit. Any contaminated soil below the processing plant will also be uplifted and carted to the open pit. Conveyor belts and concrete footings as well as non-salvageable steel will be disposed of into the open pit. The residual excavations after removal of the processing plant and primary crusher will be backfilled and levelled with selected overburden material from the open pit mining operations and covered with 500 mm of stockpiled topsoil. The plant area will be landscaped and levelled to ensure that it is contiguous with, and blends into, the surrounds. Runoff from the primary crusher site will be directed to the open pit, since this area falls within the open pit access exclusion bund. The soil and vegetation function of the land will be restored. **Workshops, diesel and oil storage explosives areas:** All structures associated with these facilities will be broken down and carted to the open pit. Contaminated soils underlying the structures will be excavated, treated and carted to the open pit and residual excavations will be backfilled and levelled using selected overburden material from open pit mining operations. The soil and vegetation function of the land will be restored. Runoff from these areas will be directed to the open pit. All other hard surfaces will be ripped and waste will be carted to the open pit. Pipelines and infrastructure will be removed and residual excavation will be backfilled and levelled with selected overburden material and covered with between 300mm and 500mm of stockpiled topsoil.
Post Closure Activities
It is assumed that all mining activities and processing operations will have ceased by the closure phase of the mining project. The potential for impacts during this phase will depend on the extent of demolition and rehabilitation efforts during decommissioning and on the features which will remain, such as the open pits and mineralised waste facilities. Detailed closure planning will be done throughout the operational phase of the mine. This planning process will incorporate technical, social, economic, and environmental input from internal and external stakeholders. Final closure implementation will take place in accordance with the final detailed closure plan.

Figure 6-1: Operational Phase Site Layout

Figure 6-2: Linear Infrastructure Layout

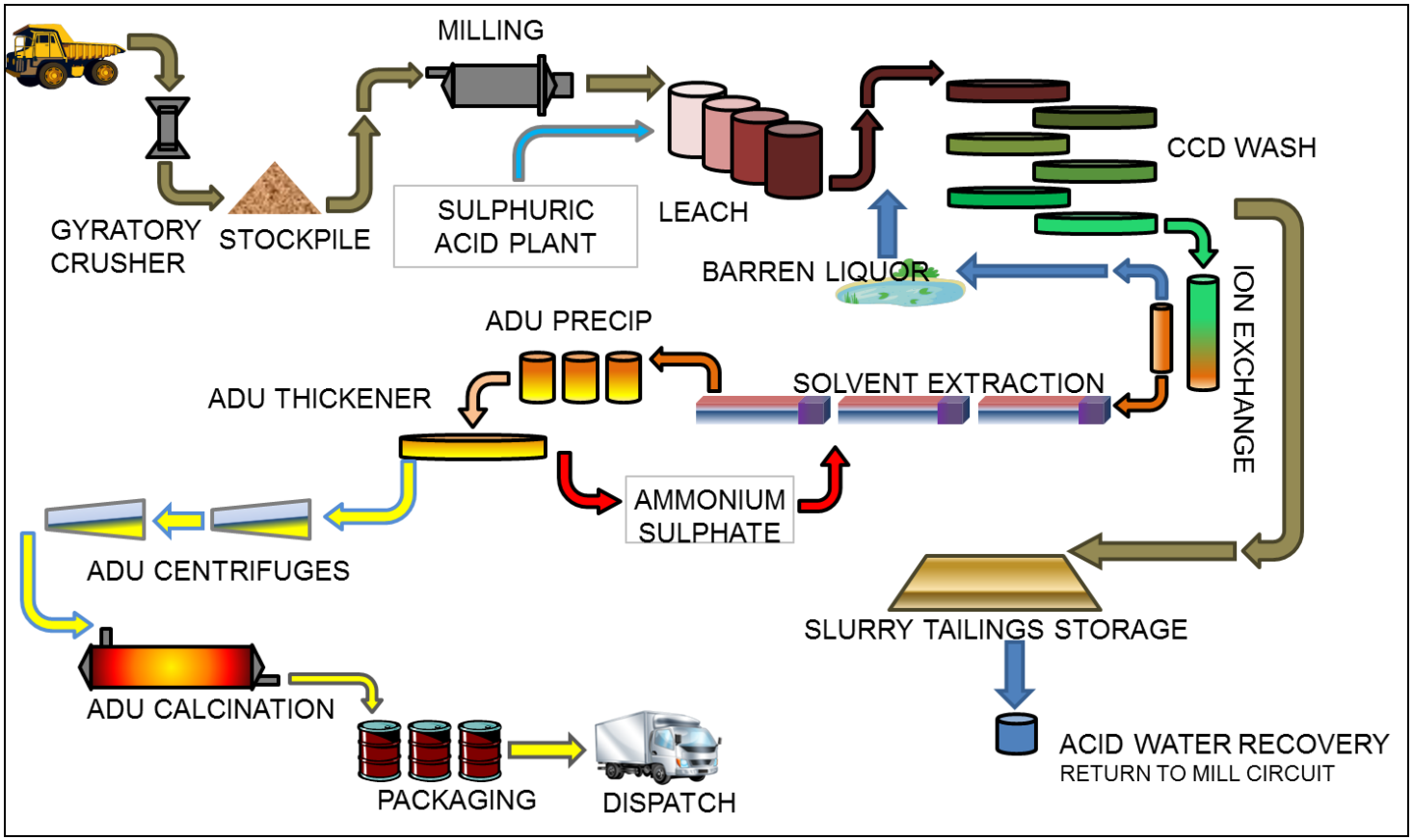

Figure 6-3: Mineral Processing Flow Diagram

7. ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan (EMP) is comprised of the following aspect specific management plans:

- Stakeholder consultation, including tourism and communication.
- Safety and security.
- Biodiversity.
- Surface and stormwater.
- Groundwater.
- Resource use.
- Air quality.
- Soil.
- Visual.
- Waste management.
- Noise.
- Socio-economic.
- Radiological.
- Archaeological.

In addition, the EMP comprises the following facility-specific management plans:

- Mineralised waste facilities comprising:
  - WRD
  - TSF
- Main Construction Contractors Camp.
- ~~Linear Infrastructure Contractors Camps.~~
- Access Road Infrastructure.
- Water Supply Infrastructure.
- Power Supply Infrastructure.
- Telecommunication Infrastructure.
- Incinerator.
- Borrow Pit Management Plan.
- Helipad Management Plan.

For each aspect, the applicable requirements of the region's Strategic Environmental Management Plan (SEMP) and the recommendations made in the various EIAs will be provided. The Management Plan to address these requirements for each environmental aspect will then be given. The management measures and commitments are formulated in such a way that they are easily auditable i.e. the following question can be asked for each commitment:

Is Swakop Uranium complying with this commitment? Yes or No?

The specific requirements of this EMP were incorporated into an Environmental Management System (EMS) that was implemented as part of the construction phase. During the construction phase, the EMS was further developed for the operations phase to the requirements of ISO 14001.

7.1 Stakeholder Consultation and Communication Management Plan

7.1.1 Introduction

Swakop Uranium identified relevant stakeholders and developed a stakeholder database during the original scoping process and has subsequently updated this database and engaged with these stakeholders during the various EIA processes (documented in the EIAs). Identified stakeholder groups are listed in Table 7-1 below.

Swakop Uranium has continued to engage with the various stakeholders on a regular basis, and will continue to strive to ensure a good working relationship between the mine and all its stakeholders. An important group of these stakeholders are the organisations that represent tourism in the Erongo and coastal region as well as individual tourism operators.

All listed stakeholders were given notification of the opportunity for review of draft EIA and EMP reports for the various EIAs.

Swakop Uranium's extensive stakeholder engagement program has already been implemented and will be augmented by the development and implementation of an equivalent of the Equator Principals' grievance mechanism.

Table 7-1: Husab Stakeholders

Stakeholder Grouping	Organisation
Local and regional government – councillors and key officers	Arandis Town Council, Erongo Regional Council, Walvis Bay and Swakopmund Town Councils
Government Ministries	o Ministry of Environment and Tourism (MET); o Directorate of Environmental Affairs o Directorate of Wildlife and National Parks (DWNP); o National Heritage Council of Namibia; o Ministry of Mines and Energy (MME); o Ministry of Education; o Ministry of Agriculture, Water and Forestry (MAWF); o Department of Water Affairs; o Ministry of Health and Social Services (MHSS); NRPA o Ministry of Labour and Social Welfare; and o Ministry of Works, Transport and Communications.
Private company with the Republic of Namibia as the sole shareholder	o Epangelo Mining Company
Government Parastatals	NamPort; NamWater; NamPower; TransNamib; Roads Authority; Erongo Red; Telecom Namibia
Neighbouring Mines / Exploration companies	Rössing Uranium; Areva Resources; North River Resources (Namib Lead), Swakop Uranium (Husab); Bannerman (Etango), Langer Heinrich Uranium; Valencia; Reptile Uranium and Zhonghe Resources.

Stakeholder Grouping	Organisation
Environmental Foundations and NGOs	Namibian Uranium Association; Namibia Uranium Institute; Namibian Coast Conservation and Management Project (NACOMA); Southern Africa Institute for Environmental Assessment (SAIEA); Earthlife Namibia; Desert Research Foundation of Namibia (DRFN); Wildlife Society of Namibia; Namibian Nature Foundation (NNF); World Wildlife Fund in Namibia (WWF); Namibia Environment and Wildlife Society (NEWS); National Botanical Research Institute (NBRI)
National Chambers	Chamber of Mines of Namibia; National Chamber of Commerce and Industry; and National Chamber of Environment.
Local Businesses	Various in Arandis, Swakopmund and Walvis Bay
Educational Institutions	Namibian Institute of Mining and Technology (NIMT); Arandis Primary School, UB Dax Senior Primary School and Kolin Foundation Secondary School.
Government Services (Arandis)	Namibian Police, MoHSS Clinic, Magistrate's Office, Post Office, Telecom, NATIS,
Residents	Residents of Informal settlements; Home owners/tenants in Arandis
Non-Governmental Organizations, Churches	Rössing Foundation; Namibia Non-Governmental Organizations' Forum (NANGOF); Walvis Bay Corridor Group; Coastal Tourism Association of Namibia (CTAN); Hospitality Association of Namibia (HAN); Fauna & Flora International (FFI)
Media	Newspapers: *The Namibian; Allgemeine Zeitung; Die Republikein; Namib Times;* Namibian Broadcasting Corporation
Other interested and affected parties	Any other people with an interest in the proposed project or who may be affected by the proposed project

7.1.2 SEMP requirements

None identified.

7.1.3 EIA Commitments

The following commitments are derived from the various Husab mine and associated linear infrastructure EIA reports, concerning stakeholder communication:

- Implement a stakeholder communication and engagement strategy. The key components of which are:
  - Maintaining an inclusive comprehensive stakeholder database that recognises both internal and external stakeholders.
  - Encouraging meaningful and transparent communication and information sharing,
  - Ongoing monitoring to ensure that the strategy is up to date.
  - Follow up auditing.

- Develop a formal complaints (grievance) procedure that incorporates measures for receiving, responding, tracking and recording complaints and grievances from both internal and external stakeholders.

7.1.4 Management Plan

Objectives:

- Ensure that ongoing feedback is provided on the relevant mining activities, together with feedback on the environmental management performance of the mine and that opportunity is provided for interested and affected parties to raise comments and concerns (complaints) on the same.
- Ensure communication/engagement strategies meet the needs of stakeholders.

Table 7-2: Stakeholder Management Plan

No	Issue	Management commitment
These commitments apply to <u>all phases</u> of the mining operation		
1	Husab's stakeholder identification	Maintain and update the stakeholder register, and record stakeholders' needs and expectations. Ensure that all relevant stakeholder groups are included.
2	Liaising with interested and affected parties	Devise and implement a stakeholder communication and engagement strategy.
3		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.
4		Use appropriate communication channels to consult with, and disseminate information to the public.
5		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, an annual sustainable development report.
6	Managing perceptions and issues/ complaints	Develop and implement a concerns/complaints (grievance) process for the public and publicise the channels through which complaints and comments can be submitted to the company. Respond within specified time frames to all complaints and comments on receipt thereof, and keep complete records of both complaints and responses.
7	Safety of 3rd parties	Through appropriate communication and inductions, provide information to educate third parties about the dangers associated with mining and mineral processing.
8	Monitoring	Monitor changes in attitude toward mining in the communities of interest.
9		Develop audit criteria for monitoring the performance of mine stakeholder engagement and communication strategies, as well as relations between the company and its stakeholders.
10	Reporting	Report as required to MME and MET, shareholders and CGNPC/Taurus Board.
11		Report as required to DWA as stipulated in conditions contained in the permit(s).
12		In the event of an emergency incident report to NNNP, DWA, MME, MET (DEA) and NRPA.

7.2 Safety and Security Management

7.3 Introduction

It is essential that safety and security measures are defined and implemented to ensure that the mine site cannot be accessed by unauthorised people. Changes to the current topography by project related infrastructure development may impact on the safety of people and wildlife. The most significant related components of the project are the open pits and mineralised waste facilities (WRD and TSF) as well as borrow pits and power line infrastructure. In addition, the potential for an increase in road accidents because of the increase in traffic because of mine related vehicles is an issue. This is addressed in detail in Table 7.41.

7.3.1 SEMP Requirements

The SEMP sets the objective that workers and the public must not suffer increased health risks from the Uranium Rush. Most of the targets and indicators relate to radiological exposure and this is briefly addressed in section 7.13 but will be covered in detail in the separate Radiation Management Plan.

The SEMP sets a target that there should be no increase in road accidents directly attributable to uranium mining. The related indicator is measured change in the rate of road accidents directly attributable to uranium mining.

7.3.2 EIA Commitments

The following commitments are derived from the various Husab mine and associated linear infrastructure EIA reports concerning third party safety and security:

- Barriers and/or warning signs will be used to keep people and animals away from hazards (i.e. hazardous excavations and infrastructure).
- A standard fence will be placed around all infrastructure. High security fencing and security access control will be provided around the plant, mine complex and other infrastructure areas.
- All staff will be trained to attend to third parties and animals to avoid situations where people and animals can enter safety risk areas.
- Educate third parties about hazards.
- Permanent aboveground mineralised waste facilities and stockpiles will be closed to have similar safety attributes to the areas' natural land forms. Structures will be stable, protected from flooding, and steep slopes will be contoured where possible.
- At closure, the open pit perimeters will be bermed. The viability of providing fencing as an additional measure will be investigated. The pit walls will be made safe from both a stability and access perspective and safe exit options will be provided. In addition, permanent warning signs will be placed at appropriate intervals, in appropriate languages with danger pictures to warn people of the risks of entering the open pits.
- Blast design for both the mine and any borrow pits, implementation and monitoring will, as a general rule, ensure that:
  - Fly rock is contained within 500 m of each blast.
  - Ground vibration at the closest third party is less than 12 mm/s peak particle velocity.
  - Air blast at the closest third party structures is less than 130 dB.
  - An audible warning will be sounded prior to each blast and the area will be cleared of persons according to the requisite mine and blast procedures.

- All complaints concerning safety and security will be documented, investigated and efforts made to address the area of concern where possible.
- Emergency situations: If people or animals do fall off or into hazardous excavations or infrastructure causing injury, or if any mineralised waster facilities fail causing injury to people or animals, or any person or animal is injured by fly rock, the Husab Mine emergency response procedure will be followed.

7.3.3 Relevant Activities

Construction	Operational	Decommissioning	Closure
Foundations Trenches Stockpiles Scaffolding Cranes Borrow pits Blasting	Open pits Stockpiles Mineralised waste facilities Water dams/reservoirs Voids Trenches Buildings and equipment Surface subsidence Pipelines Blasting	Open pits Stockpiles Mineralised waste facilities Water dams/reservoirs Voids Trenches Surface subsidence Scaffolding Cranes Piles of rubble Piles of scrap Blasting	Permanent Mineralised waste facilities Permanent water dams Permanent stockpiles Open pits Blasting

7.3.4 Management Plan

This plan is made up of the following components:

- General (third party) safety and security.
- Occupational Health and Safety.

7.3.4.1 General (third party) Safety and Security

Objective: prevent physical harm to third parties and animals from potentially hazardous excavations and infrastructure.

Table 7-3: General (third party) Safety and Security Management Plan

No	Issue	Management commitment
These commitments apply to <u>construction, operation and decommission</u> phases		
1	Prevent access of unauthorised people to the mining area	Provide appropriate fencing and security access control at relevant mine, plant and other infrastructure areas based on degree of risk. Erect barriers and/or warning signs. Train relevant staff to ensure that third parties and animals do not unwittingly enter a high risk area.
2	Educate third parties	Third parties visiting or working on the site will undergo induction and be informed of the dangers associated with hazardous excavations and infrastructure. Other forms of communication can be used to convey the same message to persons not related to the mine. Swakop Uranium will follow the requirements of the law in this regard.

No	Issue	Management commitment
3	Securing mineralised waste facilities storage facilities and stockpiles	Barriers and/or warning signs will be used to keep people away from the mine area, including the mineralised waste facilities and stockpiles where these pose a safety risk.
4	Blasting	Blast design, implementation and monitoring will ensure that: • Fly rock is contained within 500 m of each blast. • Ground vibration at the closest third party structures is less than 12 mm/s peak particle velocity. • Air blast at the closest third party structures (< 130 dB). • An audible warning will be sounded prior to each blast and the area will be cleared of persons according to the requisite mine and blast procedures. All registered complaints concerning blasting will be documented, investigated and efforts made to address the area of concern where possible.
5	Emergency	Develop and implement an emergency response plan for accidental injury to third parties or animals.
These commitments apply to operation and decommission phases only		
6	Safety risks posed by the mineralised waste facilities and stockpiles and open trenches	The waste rock dump and tailings storage facility and other stockpiles will be designed, constructed and operated in a manner that stability is a priority, that flood protection is provided and that the risk of failure is limited to acceptable levels. The mineralised waste facilities and relevant stockpiles will be closed in a manner that they present land forms that have similar safety attributes to the natural land forms in the area. In this regard, structures will be stable, protected from flood damage, and steep slopes will be contoured where possible.
7	Safety risks posed by the open pits	At closure, the open pit perimeters will be bermed. The viability of providing fencing as an additional measure will be investigated. The pit walls will be made safe from both a stability and access perspective. Permanent warning signs at appropriate points in appropriate languages and with pictures to warn people of the dangers of entering the open pits will be installed.
8	Safety issues for linear infrastructure	See Tables 7-40 to 7-45;
These commitments apply to operation and decommission phases only		
9	Early closure	The Mine Closure Plan will make provision for early closure which will require that all facilities are made safe and closed to prevent possible injury to third parties and to reduce the potential to pollute the environment.

7.3.4.2 Occupational Health and Safety

Swakop Uranium will implement a formal health and safety management system as well as a Radiation Management Plan. The main objectives of this plan are to ensure.

- A healthy and safe work environment.
- Safe systems of work.
- Safe plant and equipment.
- Avoidance of exposure to unacceptable doses of radiation.
- The availability of such information, instruction, and training as required for worker health and safety.

Regulatory requirements are set out in the Occupational Health and Safety regulations under the Labour Act, 6 of 1992 as well as the Atomic Energy and Radiation Protection Act 5 of 2005 and the Radiation Protection and Waste Disposal Regulations of 18 November 2011, promulgated under this Act. The Husab Health and Safety Plan and the Radiation Management Plan as well as requirements of other legislation and are not provided in this document.

7.4 Biodiversity (Fauna and Flora) Management

7.4.1 Introduction

The International Council for Mining and Metals (ICMM) has been instrumental in research and development of good environmental practices in mining. The ICMM's "Good Practice Guidance for Mining and Biodiversity" provides some useful insights into issues around biodiversity. In the broadest sense, biodiversity provides value for ecosystem functionality, aesthetic, spiritual, cultural, and recreational reasons. The known ecosystem related value is listed as follows:

- Soil formation and fertility maintenance.
- Primary production through photosynthesis, as the supportive foundation for all life.
- Provision of food and fuel.
- Provision of shelter and building materials.
- Regulation of water flows and water quality.
- Regulation and purification of atmospheric gases.
- Moderation of climate and weather.
- Control of pests and diseases.
- Maintenance of genetic resources (key for medicines, crop and livestock breeding).

Biodiversity can be impacted upon in the following manner by the proposed project:

- Physical destruction of fauna and flora.
- General disturbance of fauna and flora.
- Reduction of water resources as an ecological driver.

7.4.2 SEMP Requirements

According to the SEMP, ecological integrity must be maintained:

- Key habitats must be protected.
- Rare, endangered and endemic species must not be threatened.

Impacts from mining must be avoided and minimised as far as practically possible, and where impacts are unavoidable, mitigation of impacts must be achieved. Furthermore mines should become partners in conservation by supporting conservation efforts in Namibia. The table below lists the relevant targets and related indicators that have been set to achieve the objectives.

Table 7-4: SEMP Ecological Integrity Targets and Indicators

Target	Indicators
The mining industry and associated service providers must avoid impacts to biodiversity and ecosystems, and where impacts are unavoidable, mitigation; restoration and /or offsetting are achieved.	• Mining in protected areas is avoided wherever possible. • Important biodiversity areas that are not already compromised by mining, are declared red or yellow flag areas requiring special justification for any prospecting and mining applications. • Mines have special programmes or projects to actively avoid, mitigate, restore or offset their impacts, with impact avoidance predominating. • Biodiversity footprints of mines are minimized. • Infrastructure corridors are carefully planned to avoid ecologically sensitive areas and demonstrate consideration of alternatives and optimization of service provision. • Mines share infrastructure as much as possible. • Infrastructure planning and investment must take into account future demand.
Mines and associated industries support conservation efforts in Namibia	• Mines support conservation projects • Mine support protection and management of key biodiversity offset areas.
Authorisation to mine must be denied if the extinction of a species is likely.	• All EIAs must investigate and consider the extinction possibility • The Government of the Republic of Namibia must refuse project authorization if extinction likely.
No secondary impacts may occur	• Off-road driving, poaching, illegal camping, littering by mine personnel* must be discouraged by mining companies through induction and continued awareness programmes • Improved vigilance and visibility of law enforcement personnel, with structured support from civil society to reduce park/conservation transgressions.

**Mine personnel are not the only culprits*

7.4.3 EIA Commitments

The following commitments are derived from the various Husab mine and associated linear infrastructure EIA reports concerning biodiversity:

- Generally limit mine infrastructure, activities and related disturbance to those areas specifically identified and described in the EIA reports.
- Where possible, to specifically avoid the disturbance of irreplaceable biodiversity areas and important linkages between biodiversity areas.
- Where a new area will be disturbed, the following will be implemented:
  - Delineation of proposed area to be disturbed.
  - Relocation of species that can effectively be relocated (especially species of conservation concern).
  - Obtain permits in terms of the Nature Conservation Ordinance 14 of 1975 and the Forest Act, 12 of 2001 for the destruction and/or removal of protected vegetation.
  - Restoration of the biodiversity functionality in areas that have been physically rehabilitated.
  - Follow up audits and monitoring in the short and long term to determine the success of the rehabilitation and restoration activities in terms of range of performance indicators.
- If irreplaceable biodiversity will be permanently lost and restoration is not possible, a biodiversity offset will be investigated. Issues that will be considered in the investigation are as follows:
  - The size of the potentially affected area.
  - The conservation/sensitivity status of the potentially affected area.
  - The offset ratio (in terms of the required size of the offset site) to be applied.
  - Evaluation of alternative offset sites on the basis of: compensation for the mine's negative impact on biodiversity, long term functionality, long term viability, contribution to biodiversity conservation in the Namib including linkages to areas of conservation importance, acceptability to key stakeholders, distances from other mines in relation to dust fallout and other impacts, and biodiversity condition scores as compared to that at the mine site.
  - Land ownership now and in the future.
  - Status/security of the offset site, i.e. will it receive conservation status.
  - Measures to guarantee security, management, monitoring and auditing of offset.
  - Capacity of the mine to implement and manage the offset.
  - Identification of unacceptable risks associated with the offset.
  - The start up and ongoing costs associated with the offset for the life of the project.
- The use of light will be kept to a minimum and where it is required, yellow lighting will be used where possible and vertebrates will be kept away from the area around the lights with appropriate fencing where feasible.
- All relevant power lines will be equipped with appropriate bird deterrent measures to limit bird kills.
- There will be zero tolerance of harming, killing or collecting any biodiversity.
- Occupants of the drillers' and contractors' camp will remain within the camp after working hours.
- Assist relevant authorities with the maintenance of key infrastructure such as gravel roads in the Namib Naukluft National Park (NNNP) that the mine utilises.
- Noisy equipment will be well maintained to control noise emission levels.
- All water dams will be fenced off and/or netted to prevent access by larger fauna. Dams will be equipped with measures to allow fauna that fall into the water to get out.

- Strict speed control measures will be implemented for any vehicles driving within the NNNP and Dorob National Park (DNP) boundaries.
- Clean surface water will be diverted around infrastructure and activities to isolate the mine catchment from the surrounding surface water flow. Diverted water will be redirected to the natural downstream flow paths.
- Dust control measures will be implemented (see section 7.7).
- Pollution prevention measures will be implemented (see section 7.5.5.1 and 7.8.5.1).
- As part of closure planning, the designs of any permanent and potentially polluting structures (mineralised waste facilities) will take consideration of the requirements for:
  - Long term pollution prevention and confirmatory monitoring.
  - The establishment of long term biodiversity functionality, aftercare and confirmatory monitoring.
  - The isolation requirements related to periodic but ecologically important surface water flow.
- As an ongoing contribution to the knowledge and conservation of the biodiversity in the NNNP, the mine will (as a minimum) contribute towards resourcing additional key species related biodiversity studies. Priorities in this regard include:
  - A study to understand more about the Husab Sand Lizard, its range, its reaction to the cumulative destruction caused by mining developments and the resultant interactions (if any) with the Western Sand Lizard that occupies adjacent ranges.
  - A study to understand the mechanisms and water resources that Welwitschia plants utilise to sustain themselves in the desert environment.
- Emergency situations: Major spillage incidents will be handled in accordance with the Husab Mine emergency response procedure. Certain instances of injury to animals may be considered emergency situations. These will be managed in accordance with the Husab Mine emergency response procedure.

7.4.4 Relevant Activities

Construction	Operational	Decommissioning	Closure
Physical destruction			
General construction activities Management of clean and dirty water Storage and handling of new and used materials, chemicals and hydrocarbons Waste management (non-mineralised) Servicing equipment Vehicles and equipment that may leak lubricants and fuel Security lights Contractors camps Vehicle movement on access roads, internal roads and off road Mixing of concrete	Servicing equipment Management of dirty water Storage and handling of new and used materials, chemicals and hydrocarbons Waste management (non-mineralised and mineralised) Vehicle movement on access roads, internal roads and off road Use of vehicles and equipment that may leak lubricants and fuel Security lights Mine development Material handling Ore processing	General building activities Management of dirty water Storage and handling of new and used materials, chemicals and hydrocarbons Waste management (non-mineralised and mineralised) Equipment servicing Use of vehicles and equipment that may leak lubricants and fuel Material handling Security lights Vehicle movement on access roads, internal roads and off road	Seepage from remaining mineralised waste facilities and stockpiles, catchment dams
General disturbance			
General construction activities Management of clean and dirty water Storage and handling of new and used materials, chemicals and hydrocarbons Waste management (non-mineralised) Servicing equipment Use of vehicles and equipment that may leak lubricants and fuel Vehicle movement on access roads, internal roads and off road Security lights Contractors camp	Servicing equipment Management of dirty water Storage and handling of new and used materials, chemicals and hydrocarbons Waste management (non-mineralised and mineralised) Vehicle movement on roads Use of vehicles and equipment that may leak lubricants and fuel Security lights Mine development Material handling Ore processing	General building activities Management of dirty water Storage and handling of new and used materials, chemicals and hydrocarbons Waste management (non-mineralised and mineralised) Equipment servicing Use of vehicles and equipment that may leak lubricants and fuel Material handling Security lights Vehicle movement on access roads, internal roads and off road	Seepage from remaining mineralised waste facilities and stockpiles, catchment dams
Impact on water as an ecological driver			
Placement of all infrastructure, especially the mineralised waste facilities Construction of surface water containment and/or diversion infrastructure – berms, channels, dams.	Placement of all infrastructure, especially the mineralised waste facilities Water containment and/or diversion infrastructure – berms, channels, dams. Water abstraction related activities.	Placement of all infrastructure, especially the mineralised waste facilities Water containment and/or diversion infrastructure – berms, channels, dams.	Placement of final land forms with associated water containment and/or diversion infrastructure – berms, channels, dams.

7.4.5 Management Plan

The detailed management plan is provided below and indicates how impacts will be avoided, minimised and mitigated. This management plan takes into account the requirements of the SEMP and the EIAs. The Swakop Uranium Environmental Section ~~Department~~ will be responsible for implementing the relevant management measures.

This plan is made up of the following components:

- Managing the physical destruction of biodiversity.
- Managing general disturbance.
- Reduction of water resources as an ecological driver.

7.4.5.1 Managing Physical Destruction of Biodiversity

Objective: prevent or limit the unacceptable loss of biodiversity and related functionality through physical disturbance.

Table 7-5: Physical Destruction of Biodiversity - Management Plan

No	Issue	Management commitment
These commitments apply to <u>construction</u>		
1	Impacts on Welwitschia plants	In consultation with experts and stakeholders establish research required and design a baseline project that, as a minimum considers: • Current population size and structure. • Population viability. • Ecology and population dynamics. • Water physiology of Welwitschias (i.e. from where do they get their water and what is their root system?). Impacts on Welwitschias will be avoided. Where this is not possible the relevant permit will be obtained for removal thereof. Drainage lines that supply Welwitschia populations with water will be avoided where possible, and diverted water flow will be re-directed back to the Welwitschias as appropriate.
2	Impacts on Husab Sand Lizard	Initiate studies on the Husab Sand Lizard to determine, as a minimum, the spatial distribution of the species, and, ideally, its reaction to the cumulative destruction caused by mining developments and the resultant interactions (if any) with the Western Sand Lizard that occupies adjacent ranges. Determine the impacts of disturbance on the species' dynamics and develop a management plan for it if necessary. Avoid development or disturbance on areas where Husab Sand Lizards are known to occur - especially rocky areas and ridges. Minimise mine construction footprint size.
3	Loss of gerbil population and their ecosystem engineering role	As far as possible avoid development in areas with high densities of gerbil colonies. Keep the mine development footprint as small as possible. Consider studies on the ecological role of gerbils with the objective of understanding their potential role in ecological restoration of the area at closure.

No	Issue	Management commitment
4	Impacts on flora and fauna on marble ridges and hard undulating plains	Minimise mine construction footprint size. Prior to construction, identify and map all sensitive vegetation likely to be disturbed by mining and infrastructure. Assess usefulness of plant rescue and translocation operations in consultation with relevant specialists. Obtain permits for plant destruction or rescue and relocation.
5	Destruction of organisms and their habitats	~~Before construction, identify areas that may host aestivating frogs and relocate them to similar nearby habitat.~~ Before construction, identify possible breeding dens and nests of larger animals, try to avoid them in site layout planning, ~~For example, the suricates denning in the centre of the TSF location should be encouraged (herded while they are foraging) to move westwards off the mining license area into other parts of their territory.~~ Consult specialists if sites are likely to be disturbed and discuss removal options. Construction of the Emulsion Manufacturing Plant shall avoid the game trail and be located away from significant *commiphora* plants. Endeavour to capture and release all reptiles into similar, nearby habitats. As part of a biodiversity management plan, identify areas for preservation and designate these as no-go areas. Use Figure 7-1 as a guide. Deliberate trapping, collecting, harming, poaching or killing of local fauna is prohibited. The harvesting or collection of plant material is prohibited. Animals have right of way on all access roads. Minimise the number of roads and tracks and keep them as small as possible. Vehicles must use established access roads. No off road driving All drivers to adhere to the site and NNNP speed limits. Obtain necessary permits for plant destruction and/or rescue and relocation. Commence rehabilitation as soon as an area that will not be used for future activities becomes available.
6	Fragmentation of habitats	Map the extent and contiguousness of habitats before, during and after construction (i.e. during operations). Minimise Husab Mine ~~construction~~ footprint size. As far as is possible, do not place service or other infrastructure (especially roads) in ecologically sensitive areas, or in areas identified as corridors of animal movement, or close to springs. Keep drainage lines open, e.g. towards the Khan River, to keep the corridor function intact for animals and invertebrates. If possible, bury all pipelines below ground. Otherwise ensure that regular over- or underpasses are constructed along the line. Where fragmentation is unavoidable, consider the opportunities to create biodiversity offsets.

No	Issue	Management commitment
7	Issues related to linear infrastructure	See tables 7-40 to 7-45.
These commitments apply to construction, operation and decommissioning		
8	Impacts on fauna and flora in general	Implement an alien/invasive/weed management programme. Care should be taken as to not have a negative impact on the surrounding species. Investigate a biodiversity offset if irreplaceable biodiversity will be permanently lost and restoration is not possible. Install clean and dirty water systems. Redirect diverted flow back to natural flow paths. Cut off mechanisms used to divert water flow around structures, such as the waste rock dump, should ideally redirect the cut off water flow proportionally back into the downstream sections of the channels that were blocked. Lighting used for safety and security will be kept to a minimum. Yellow lighting will be used where possible. Lights will be directed downwards. Monitor vertebrate activity around lights and take precautions to prevent unnecessary mortalities. Investigate bird deflectors and dummy poles for internal power lines and transformers. If practical, fence and/or net all water dams to prevent access by larger fauna / birds. Equip dams/ponds with measures to enable fauna that may fall into the water to get out. (Refer to Table 7-7 for additional measures relating to the TSF). Deliberate trapping, collecting, harming, poaching or killing of local fauna is prohibited. Investigate animal deterrent measures (e.g. reflective strips or disks on fence) for problem areas when needed.

No	Issue	Management commitment
	Impacts on fauna and flora in general (contd)	The harvesting or collection of plant material is prohibited. Animals have right of way on all access roads. Occupants of the drillers' and contractors' camp will remain within the camp after working hours. No off track driving is allowed. All personnel to adhere to the site and NNNP speed limits. Where a new area will be disturbed, the following will be implemented: Prior to disturbance, identify and map all sensitive vegetation. Assess usefulness of plant rescue and translocation and then obtain necessary permits for plant destruction or rescue and relocation. Where possible, commence rehabilitation as soon as area becomes available. Undertake follow up audits and monitoring in the short and long term to determine the success of the rehabilitation and restoration. Dust control measures will be implemented (Section 7.7) Pollution prevention measures will be implemented (Section 7.5.5.1 and 7.6.5) Minimise noise (Section 7.11) Minimise inward migration of people (Section 7.12) Conserve soils (Section 7.8) No alien or foreign (i.e. domestic or wild) animals or vegetation are allowed on site.
9	Educate workers	Educate all workers on the sensitivity of the mine site and surrounds and on species of conservation importance
10	Monitoring	Monitor success of plant and animal (where possible) rescue and translocation projects.
11		Develop a bio-diversity monitoring plan that will be implemented throughout the life of mine. Regularly inspect areas adjacent to operations for signs of illegal plant or fauna collection or hunting. Monitor power lines and relevant infrastructure (i.e. transformers) for bird kills.
12		Implement the long term monitoring programme for the Welwitschias.
These commitments apply to <u>construction, operation, decommissioning and closure</u>		
13	Rehabilitation of destroyed or damaged habitat	Develop a restoration plan in consultation with relevant experts and stakeholders at an early stage in the life of mine and integrate it with the mine closure plan. Initiate restoration trials at an early stage in the life of mine in order to allow the investigation of the most appropriate approaches. Monitor the results and adapt the restoration plan throughout life of mine to achieve best results. If required, initiate trials to determine the best strategy for successful plant rescue and transplanting operations. Establish a restoration budget as part of the closure rehabilitation fund and the operational budget for concurrent rehabilitation. Identify biological source areas that will 'seed' the rehabilitation sites. Develop a monitoring programme to follow the positive and negative changes in ecosystem properties.
14		Invest in a rehabilitation and restoration research programme for long term reintroduction of ecological processes at the Husab Mine site on closure.

No	Issue	Management commitment
15		All residual surface infrastructures will be made safe and contoured so as to blend in with the surrounding landscape and stabilised so as to protect them from erosion and flood waters.
16		Erosion control measures will be implemented to ensure that the topsoil is not washed away and that erosion gullies do not develop prior to vegetation establishment.
17		Do not disturb undisturbed tracts of land during the process of rehabilitation.
18		As part of closure planning, the designs of any permanent and potentially polluting structures (mineralised waste facilities) will take consideration of the requirements for: • Long term pollution prevention and confirmatory monitoring. • The establishment of long term biodiversity functionality, aftercare and confirmatory monitoring. • The isolation requirements related to periodic, but ecologically important, surface water flow. Regularly review the closure plan and its objectives, update and ensure adequate financial provision is made for closure.
19	WRD footprint blocking the Husab Drainage Channel: Loss of surface water flow volume as an important ecological driver, specifically relating to the Welwitschias	A more detailed level of engineering design (based on LIDAR topographical survey data and test excavations along the envisaged channel route) relating to the Husab Drainage Channel diversion must be completed prior to the implementation of the proposed WRD design changes. This more detailed level of engineering is required to quantify the following technical aspects for both the operational and closure phases: • Routing and configuration of the Drainage Channel, • Gravity based water conveyance (i.e design and install the Diversion Channel that allows matching flow of water to the Original Husab Drainage Channel, downstream of the new WRD footprint) and • Erosion / sedimentation control. • No waste rock to be dumped on the Husab Drainage Channel and beyond until the engineered design of the diversion channel is approved. Until then no waste should be dumped closer than 50m to the western banks of the main Husab Drainage Channel. • Monitor the health of plants downstream of the WRD and compare with unaffected plants.

No	Issue	Management commitment
		The following actions must furthermore be implemented as part of the proposed diversion of the Drainage Channel: • Onsite construction of diversion channel test excavations in areas with underlying calcrete; • Revise storm water runoff design from the lower WRD structure; • The hydrology of the current Husab Drainage Channel must be faithfully mimicked to ensure that the stream bed is not eroded. • Design of the diversion channel to allow for the effective diversion of stormwater flow for an indefinite period after mine closure without care and maintenance. That includes the prevention of potential erosion or sedimentation of the diversion channel. • The relevant design engineer will work with biodiversity, water and soils specialists to ensure that long term (post closure) ecosystem functionality aspects are integrated into and form part of the engineering design of all surface and subsurface aspects of the diversion channel. Effective site supervision to ensure no blocking of stormwater infrastructure and efficient storage of contact water. • Installation of runoff/groundwater level monitoring devices in the Husab Drainage Channel up- and downstream of WRD • No waste rock to be dumped on the Husab Drainage Channel and beyond until the engineered design of the diversion channel is approved. Until then no waste should be dumped closer than 50m to the western banks of the main Husab Drainage Channel.
20	Change in WRD design - Direct destruction of organisms and their habitats	• Rescue and translocate plants of conservation concern where possible. • The final design should avoid all Welwitschia plants as well as Marble Ridges. However, the small Marble Ridge south of the approved WRD will most likely be impacted by the proposed expansion. In the event that the WRD does impact this (small Marble Ridge) SU must initiate an inspection of protected species and (where required) relocate these species (i.e. “search and rescue”). See more details below. • Plant rescue: A botanist should therefore be consulted to determine the presence of species of conservation concern underneath the expanded footprint (including the above mentioned Marble Ridge) and to provide guidelines and guidance during the translocation. All necessary permits should be obtained. • Soil, rocks and other material from the marble ridge to be collected and stockpiled for future rehabilitation and restoration activities of disturbed marble ridges located on site (before tipping waste rock material).

Figure 7-1: Biodiversity Sensitivity Map and “No-Go” Areas

7.4.5.2 Managing General Disturbance

Objective: prevent disturbance to biodiversity.

Table 7-6: General Disturbance to Biodiversity - Management Plan

No	Issue	Management commitment
These commitments apply to construction, operations and decommissioning		
1	Decreased plant vigour and fitness and or decreased biological soil crust quality as result of dust deposition	Measure and monitor potential impacts of fallout dust from mining and dirt roads on Welwitschia and other key plant species' growth and reproduction. Were possible, avoid development in or in proximity to areas identified as ecologically sensitive (Figure 7-1). The main site access road will be tarred. Dust suppression methods will be used on all other major internal unpaved road surfaces (section 7.7).
2	Disruption of animal movements (especially zebras)	The mine and plant footprint will be limited as far as possible. Investigate potential impacts on the movement of large ungulates as a result of mine and related infrastructure. A baseline study on birds was conducted as part of the linear EIA. Monitoring of bird collisions/electrocutions with new Husab power lines must be implemented in conjunction with the NNF program. Fencing is required for security and safety purposes. However, if possible, minimise the amount of fencing on site and try to avoid placing fences across known movement corridors. Investigate provision of access corridor to Khan north of mine. Service infrastructure to try and avoid ecologically sensitive areas, animal corridors, feeding areas and springs. Where this is not possible, investigate suitable mitigation measures. Overland pipelines will have under- or overpasses for animals. Adhere to NNNP rule regarding night driving. Minimise night time traffic on major access roads where possible. Investigate and report (also to DWNP) on all animal deaths caused by vehicles or mining activities. Commence rehabilitation as soon as an activity has ceased, focusing on strategic and key corridors first Periodically monitor use of over- or underpasses by animals and adapt design if necessary. Monitor effectiveness of rehabilitation and restoration. Installation of appropriate bird deflectors and dummy poles on relevant power lines and transformers where required (see table 7-43).
3	Light pollution	Minimise night lighting and avoid vagrant light by installing lights which emit a unidirectional beam. Where light is only intermittently needed, use motion detectors, time switches or similar to only supply light when needed Use yellow outdoor lights (invertebrates see yellow poorly).
4	Pollution of the environment	Implement an efficient waste management system section 7.10. Provide adequate sanitation facilities for workers. Develop and implement spill management procedures. Monitor the areas outside of the mine footprint for evidence pollution arising from construction, operational and decommissioning activities.

No	Issue	Management commitment
5	Attraction of fauna to site	Keep immediate work areas (i.e. offices, workshops, ponds, etc.) free of vegetation to prevent attracting fauna. Manage water sources and infrastructure in such a manner as to avoid pooling or standing water which will increase/promote vegetation growth and attract various fauna to the work areas.
6	Larger WRD footprint also being closer to the Welwitschias	○ The edge of the WRD should be kept as far as possible from the closest Welwitschia and other plant species, ○ In light of the uncertainty relating to the impacts of dust on vegetation (as was identified in the original EIAs), the precautionary principle should be invoked by implementing additional actions: ○ The health and dust loads of plants close to the WRD should be monitored regularly. This will mean the addition of more plants to the current monitoring programme, ○ SU commissions a revised air quality model, integrating all of the amended facilities / activities. This will enable SU to ensure the current dust monitoring plan (as presented in the EMP, taking the above into consideration) is still relevant. However, more dust buckets should be deployed at increasing distances around the periphery of the WRD, with particular emphasis on areas to the SSE, S and SW of the WRD. ○ A study should be done to understand the potential for fine dust to cake the soil surface and thus prevent infiltration by local rainfall. This study should include an assessment of the pattern of dust events relative to the plants' diurnal physiological cycles and climatic variables. ○ Dust suppression will be undertaken through chemical binding agents and/or water sprays combined with vehicle speed controls on haul roads specially in close proximity the Welwitschias. ○ Mitigation methods should be adapted according to the findings of the monitoring programme and the infiltration study suggested above.

7.4.5.3 Reduction of Water Resources as an Ecological Driver

Objective: prevent the unacceptable loss of biodiversity and related functionality through a reduction in impacts on the key ecological drivers of groundwater and temporary surface water flow.

Table 7-7: Reduction of Water as an Ecological Driver - Management Plan

No	Issue	Management commitment
These commitments apply to <u>construction, operations and decommissioning</u>		

No	Issue	Management commitment
1	Impacts on Welwitschia plants	Initiate studies on surface, near surface and ground water to determine what impact mining and related infrastructure activities may have on Welwitschias. Maintain the groundwater model for the mine and update this model at least every two years ~~annually~~ with actual quality and water level monitoring data. Ensure that diverted ~~channel~~ clean water is re-directed to the main Welwitschia population by implementing the revised Surface Water Management Plan (SLR, 2017 – to be updated with the additional findings/commitments from the EIA for the WRD design amendments). ~~detailed in Appendix H of the EIA Amendment Report.~~ Vegetation and soil moisture must be monitored downstream of the smaller cut-off channels to determine the proposed dam and dispersion channels is required.
2	Impact on ecological processes linked to interference with water flow and supply	Clean surface water will be diverted around the mine and related infrastructure and re-directed back to natural downstream flow paths. This will be achieved by implementing the Surface Water Management Plan (SLR, 2017 – to be updated with the additional findings/commitments from the EIA for the WRD design amendments). ~~detailed in the Linear EIA and Appendix H of the EIA Amendment Report.~~ Design a land-use plan to ensure that important washes and channels are conserved as far as possible. The Husab Drainage Channel will however be blocked as a result of the WRD amendment and the Channel must be realigned via a clean water diversion channel (engineered design) or be reshaped in order to not block the main flow. Minimise total footprint of construction, operation and decommissioning activities. Avoid placing any infrastructure or waste material across drainage lines or close to springs. Where unavoidable ensure uninterrupted drainage by constructing bypass channels. With the sanction of the DWAF, *Prosopis* trees from the Ida Dome compartments of the Swakop River should be removed and the area kept clear with annual follow ups, in line with Swakop Uranium's "Company Biodiversity Action Plan". Actively protect catchments and point water sources within the mine area. Limit access by mine people to all springs. Monitor health of plant populations (i.e. Welwitschias and riverine vegetation) inside and adjacent to drainage lines.
3		Research is required into the population dynamics of *Petalidium pilosi-bracteolatum* to improve the conservation efforts of this endemic, highly range-restricted species.
4	Potential impact on riparian vegetation in rivers, if Husab impacts water levels.	Alternative sustainable engineering solutions should be investigated during the LOM. Monitor potential impacts on the compartments of the Khan and Swakop aquifers that are affected on by the Husab mine. Establish a programme that monitors the health and vigour of riparian vegetation and trees if Husab affects water regimes in either river.

No	Issue	Management commitment
5	Ecological effect of open water in a desert environment	All water bodies should be fenced off and/or netted to prevent access by larger fauna. Dams/ponds will be equipped with measures to allow fauna that may fall into the water to get out. This does not apply to the TSF pond. Although the TSF itself will be fenced to keep fauna away, the TSF pond cannot be fenced/netted. The TSF and Sewerage Treatment Plant perimeter fence should be monitored to determine if it is being breached by animals, and if, so, additional measures to prevent ingress should be taken. The following measures to be implemented to limit the TSF pond size and divert birds away from this area: • Siphon water from the TSF pond and re-circulate to the plant or use for dust suppression (once treated, tested and relevant approvals obtained (DWAF). • Remove all vegetation associated with the water, to prevent an artificial ecosystem from establishing. Also, preventing the vegetation from damaging the liner/concrete. • Investigate placing ~~Place~~ bird deterrents on large open water facilities. • Monitor deterrent effectiveness and the types and number of birds that visit. Inspect and service pipelines regularly to prevent unexpected ruptures, fix leaks. Regularly review baseline risk assessments to determine effective implementation of mitigation control measures and include lessons learned. Minimise use of water and reuse and recycle where possible. Monitor water facilities for birds and other fauna. Further research required in terms of animals frequenting the TSF and their subsequent movements to (1) evaluate the extent of the problem; and (2) test and adjust methods of reducing such visits.

7.5 Surface and Stormwater Management

7.5.1 Introduction

Water is a scarce resource in Namibia, particularly along the west coast. In the context of the desert environment most surface water either evaporates or percolates into the ground. In very few instances strong rainfall leads to temporary flowing surface water resources. In all of these instances water is a key driver in the desert environment both in terms of consumption and use by humans and biodiversity in the broadest sense.

The Husab mine will introduce a range of infrastructure and activities that have the potential to change surface flow patterns, reduce run off into the natural environment and pollute surface water resources.

7.5.2 SEMP Requirements

The SEMP aims to ensure that the public have the same or better access to water in future as they have currently. The following targets have been set:

- The Uranium Rush must not compromise communities' access to appropriate quality water.
- The Uranium Rush must not compromise surface water movement and availability.
- Additional water resources must be developed to meet industrial demand.

The relevant targets and indicators set by the SEMP are tabled below.

Table 7-8: SEMP Water Related Targets and Indicators

Target	Indicators
The Uranium Rush must not compromise communities' access to appropriate quality water.	Aesthetic/physical, inorganic and bacteriological determinants must conform to minimum required quality as prescribed in the national water quality standards.
The Uranium Rush must not compromise groundwater movement and availability.	• There must be no unusual loss of wetland and riparian vegetation or phreatophytes. • All water supply infrastructure must be maintained. • Disaster management plans must are in place and implemented.
Additional water resources must be developed to meet industrial demand.	• Desalinated water must meet mine demand by 2011. • No industrial investor may be lost because of water unavailability. • Water availability exceeds 99 % of demand.

7.5.3 EIA Commitments

The following commitments are derived from the various Husab mine and associated linear infrastructure EIA reports concerning surface water:

- All hazardous chemicals (new and used), dirty water, mineralised wastes and non-mineralised wastes will be handled in a manner that they do not contaminate surface and near surface water run-off.

- Surface water and near surface water management facilities will be designed, constructed and operated so that dirty water is kept separate from clean water run-off

through a system of berms, channels, trenches, flood protection measures, erosion protection and dams.

- The potential for contamination of run-off from the mineralised waste facilities will be further minimised by ensuring that inert waste rock/overburden materials are placed on the exposed run-off areas of these facilities.
- ~~Dirty water run-off and near surface water will be contained in three lined dams that will be designed and constructed to contain the 1:100 year storm event.~~
- Realignment of the Husab Drainage Channel via a clean water diversion channel (engineered design).
- If surface and near surface related discharges occur, the mine will monitor the water discharge quality (non radiological and radiological). If the quality of the monitored discharge is above acceptable domestic use levels, additional measures will be identified and implemented to prevent and/or capture the future potential for surface water related discharge and pollution. This may involve the construction of interception trenches for the collection of seepage and the pumping the water to one of the pits.
- The mine's radiation management plan will include the findings of the 2010 EIA and the 2013 and 2018 EIA amendments with specific attention on the management of the radiological surface water pathway, the related environmental monitoring requirements, and minimising doses to acceptable levels.
- As part of closure planning, the designs of any permanent and potentially polluting structures (mineralised waste facilities) will consider the requirements for long term surface water pollution prevention and confirmatory monitoring. This will require full capping of the TSF and may also require active monitoring and management interventions that have to be implemented for as long as contamination concerns exist.
- Emergency situations: Major spillage incidents (including tailings spillage incidents from the delivery pipeline and/or TSF failure) will be handled in accordance with the Husab emergency response procedure.

7.5.4 Relevant Activities

Construction	Operational	Decommissioning -	Closure
General building activities Management of dirty water Storage and handling of new and used materials, chemicals and hydrocarbons. Waste management (non-mineralised) Equipment servicing Vehicles and equipment hydrocarbon leaks Dust fallout	Servicing equipment Management of dirty water Storage and handling of new and used materials, chemicals and hydrocarbons. Waste management (mineralised and non-mineralised) Stockpile development Dust fallout Equipment servicing Ore processing Tailings storage facility Waste rock dump	General decommissioning activities Manage dirty water Storage and handling of new and used materials, chemicals and hydrocarbons. Waste management (mineralised and non-mineralised) stockpiles Vehicles and equipment hydrocarbon leaks Dust fallout Tailings storage facility Waste rock dump	Seepage, runoff and dust fallout from remaining mineralised waste facilities and stockpiles, and catchment dams

7.5.5 Management Plan

This plan is made up of the following components:

- Pollution of surface water.
- Process/industrial effluent.
- Domestic effluent.
- Spills.

7.5.5.1 Pollution of Surface Water

Objective: prevent pollution of surface water run-off and mitigate accidental spills.

Table 7-9: Pollution of Surface Water Management Plan

No	Issue	Management commitment
These commitments apply to design and operation phases		

No	Issue	Management commitment
1	Clean and dirty water	Surface water runoff and near surface water upstream of, and within the project area after rainfall events will be managed by the following infrastructure to ensure that clean and dirty water systems are kept separate: • Clean water interceptor channels designed to divert any clean surface and near surface water from upstream of the project area will divert this water back into the natural environment. • A proper engineering design must be done for the diversion channel to transport runoff around the proposed WRD to the downstream receptors without compromising the natural flow volumes during flood events or increase erosion; this will exclude the construction of a downstream collection pond to ensure a long term solution, which does not require continuous maintenance after mine closure. • ~~A percentage of the clean water diverted around the WRD could be channelled back into the natural channels that have reduced run-off volumes owing to the presence of the WRD. However, this scheme will only be implemented should bio-diversity monitoring indicate the need to do so.~~ • No waste dumping on or beyond the Husab drainage permitted until a detailed engineered design for the diversion channel is approved and considered feasible; • Toe paddocks around the perimeter of the WRD constructed of calc-silicate or other neutralizing waste rock to neutralize and prevent any form of acid rock drainage or contaminated runoff from the sides of the WRD to reach the downstream receptors (instead of a contact water diversion channel); • The toe paddocks should be constructed high enough to contain the 1:100 year peak volumes and allow the water to evaporate. Any runoff water that infiltrate into these toe paddocks will be neutralized by the calc-silicate and underlying calcrete rock • Toe paddocks to be designed in order to capture WRD runoff after occasional rainfall events and to prevent pollution of surface- and groundwater. • Toe paddocks should be constructed that WRD runoff water will be collected in suitable sized drains and subsequently allowed to be evaporated, while possible pollutants will be kept back in the paddocks. The toe paddocks are considered to be a long-term mitigation measure that will effectively prevent pollutants from the WRD reaching downstream areas through surface water flow. Care and maintenance after mine closure is not required (as would be the case with dirty water diversion channels and pollution control dam dams (PCDs)).

No	Issue	Management commitment
		• ~~Similarly,~~ Interceptor channels and/or diversion bunds may be used to distribute fresh water run-off from the area around the TSF to the natural channels downstream of the TSF should biodiversity monitoring results indicate the need to do so. • Dirty water cut off channels are designed to ensure that dirty water generated on the project area is captured and then diverted to one of the ~~three~~ stormwater pollution control dams (PCD) for containment (as per the Stormwater Management Plan – SLR, 2017). • Each PCD will be sized to contain at least the 1:100 year storm event. Water collected at these dams will be reused in the process, left to evaporate or will be used for dust control should it meet the quality requirements.
		• Plant storm water will be collected in the plant Run-off Dam ~~process water dam~~ within the plant area and is designed for the 1:100 year rainfall event. The plant area will be treated in isolation from the rest of the mine run-off. • The ~~full~~ Surface Water Management Plan was updated in 2017 (SLR, 2017) - to be updated with the additional findings/commitments from the EIA for the WRD design amendments ~~and must be is provided in Appendix H of the 2013 EIA Amendment Report.~~
These commitments apply to <u>construction, operation and decommissioning phases</u>		
2	General surface water pollution/ spills	All hazardous chemicals (new and used), dirty water, mineralised wastes and non-mineralised wastes are stored, used, handled and disposed of in a manner that they do not contaminate surface and near surface water run-off.
3	Linear infrastructure commitments are contained in Tables 7.39 to 7-45.	Dirty water run-off (except for the WRD) will be contained in dams that will be designed and constructed to contain the 1:100 year storm event as per the updated Surface Water Management plan (SLR, 2017 – to be updated with the additional findings/commitments from the EIA for the WRD design amendments). ~~detailed in Appendix H of the EIA Amendment Report.~~ Dirty water from the WRD will be captured in toe paddocks constructed around the WRD and allowed to evaporate (2018).
4		Establish and maintain concrete bunded areas around all diesel generators, and / or other best practice where required. Refer to Table 11-1 for bunding minimum requirements and maintenance.
5		Construct purpose built wash bays for the washing/decontamination of vehicles and equipment. Refer to Table 11-1 for wash bay minimum requirements and maintenance.
6		Place spill kits in all areas where potentially polluting substances are dispensed and stored and train the relevant staff to use it.
7		Cement and cement additives ~~aggregate~~ will be stored and mixed on impermeable covers. Concrete will not be mixed directly on the ground. Emptied cement bags will be stored in weatherproof containers and disposed of regularly and will not be used for any other purpose. All excess cement will be collected from the batching plant on a ~~daily~~ regular basis and disposed of in a designated area in the waste rock dump or at a dedicated (designed) area that is impermeable.

<table>
<tr><th>No</th><th>Issue</th><th colspan="2">Management commitment</th></tr>
<tr><td>8</td><td rowspan="9"></td><td colspan="2">No sanitation facilities should be located within 100 m of a watercourse or wash or 500 m from a borehole.</td></tr>
<tr><td>9</td><td colspan="2">Vehicles and equipment will be properly maintained and oil or fuel leaks will be repaired immediately upon detection.</td></tr>
<tr><td>10</td><td colspan="2">Any spills will be cleaned up immediately.
Spill kits or adsorbent materials will be kept on hand to clean up spills.
Once used, this material will be treated as hazardous waste and disposed of accordingly</td></tr>
<tr><td>11</td><td colspan="2">As part of closure planning, the designs of any permanent and potentially polluting structures (mineralised waste facilities) will consider the requirements for long term surface water and near surface water pollution prevention and confirmatory monitoring.</td></tr>
<tr><td>12</td><td colspan="2">Develop a mine radiation management plan that will include the findings of the 2010 EIA and various (relevant) EIA Amendments with specific attention on the management of the radiological surface water pathway, the related environmental monitoring requirements, and minimising doses to acceptable levels.</td></tr>
<tr><td>13</td><td rowspan="4">Separation of clean and dirty water systems</td><td colspan="2">Regularly update the operational site wide water balance by taking rainfall to ensure that the design of the relevant clean and dirty water systems are sufficient to cater for the water volumes associated with the infrequent flood events and that unacceptable discharges of polluted water are prevented.</td></tr>
<tr><td>14</td><td colspan="2">~~The potential for contamination of run-off from the mineralised waste facilities will be further minimised by ensuring that inert waste rock/overburden materials are placed on the exposed run-off areas of these facilities.~~</td></tr>
<tr><td>15</td><td colspan="2">The quality of surface and near surface discharges will be monitored and additional measures put in place if the quality is found to be unacceptable.</td></tr>
<tr><td>16</td><td colspan="2">Closure planning will consider the requirements for long term surface and near surface water pollution prevention and confirmatory monitoring for the mineralised waste facilities until a sustainable solution is achieved.</td></tr>
<tr><td>17</td><td>Handling and storage of reagents</td><td colspan="2">Reagents will be properly stored and handled.
Material Safety Data Sheets (MSDS) will be kept and adhered to. Where MSDS information is found substandard, best practice should be implemented.
The table below provides a list of expected reagents to be used on site as well as how these will be handled at stored. Note this list may be subject to change and cannot be used as a compliance measure.

<table><tr><th>Reagent</th><th>Handling and storage</th></tr><tr><td>Pyrolusite</td><td>Pyrolusite will be delivered in powder form in bulk bags in a container. It will be stored in the reagent storage area in the bulk bags stack. The annual consumption of pyrolusite will be approximately 45 000 tons.</td></tr><tr><td>Flocculent</td><td>Two different types of flocculent are required. They will be delivered to site in one ton bulk bags, and stored in the reagent storage area in the bulk bags stack. The total annual consumption of flocculent will be approximately 2 500 tons.</td></tr></table></td></tr>
</table>

No	Issue	Management commitment	
		Sulphur	This will be trucked to site as sulphur ~~pellets~~ prills for use in the acid plant. The tonnage will be about 130 000 tpa. It will be stored on a cement pad in bulk stockpile. ~~in the reagent storage area in hoppers.~~
		Sulphuric Acid	This will be produced on site. As a back-up option, acid will be trucked to site if required. Should concentrated sulphuric acid be imported to site in place of the acid plant, approximately 400 000 tons will be required. This would be delivered to site in bulk road tankers ~~isotainers (tank)~~ and stored in acid tanks.
		Shellsol 2325 diluent	This will be delivered by road tanker and unloaded into a storage tank that provides up to 60 days storage. Diluent is a combustible liquid and fire protection systems will be provided in the storage / distribution area. Annual consumption is expected to be about 470 tons.
		Extractant - Alamine 336	This will both be delivered to site in one m^3 intermediate bulk containers (IBC's) and stored in a shed. The annual consumption is approximately 20 tons.
		Modifier – Isodecanol	This will both be delivered to site in one m^3 intermediate bulk containers (IBC's) which will be stored in a storage shed. The annual consumption is approximately 10 tons.
		Anhydrous Ammonia	This will be delivered to site by bulk road tankers and stored on site. Annual consumption is expected to be approximately 4000 tons.
		Ferrous Sulphate	This is delivered in bulk bags. ~~Currently this is not required in the leaching process, however adequate space is being allowed for handling and make-up should it be required at a later stage. If required it will delivered and stored in bulk bags.~~
		Sodium Hydroxide	Two different types of flocculent are required. They will be delivered to site in one ton bulk bags, and stored in the reagent storage area in the bulk bags stack. ~~This (as 50% solution) will be delivered to site by road tanker and unloaded to the sodium hydroxide storage tank, which provides seven days storage.~~ Annual consumption is expected to be approximately 9 000 tons.
		Coagulant	This reagent is not currently in use in the metallurgical process. ~~This will be delivered to site in one m^3 IBC's which will be stored in the reagent storage area. The IBC's will be transferred to the mixing area using a forklift and drained into the coagulant storage tank. Annual coagulant consumption is expected to be approximately 230 m^3.~~
		Sodium Carbonate	This will be delivered to site in one ton bulk bags, and stored in the reagent storage area in the bulk bags stack. ~~This will be delivered to site by bulk road tanker and stored in the sodium carbonate bin, fitted with dust collector.~~ Annual consumption is expected to be approximately 1 000 tons.
		Activated Carbon	Approximately 15 tons of activated carbon will be required on an annual basis. This will be delivered to site in either drums or bulk bags and stored as such until required.

No	Issue	Management commitment	
		Resin	Approximately 350 m^3 of make-up resin will be required for the ion exchange circuit. This will be delivered to site in bulk bags and protected from the elements.
		Grinding Media	Steel balls will be required in the SAG and Ball milling circuit and will be delivered in bulk in truck and stored in the steel ball bunker near the mills. Annual consumption is expected to be approximately 17 000 tons.
		Water treatment chemicals	Minor quantities of water treatment chemicals will be required on site for boiler feed, cooling towers, RO plant, demineralised water plant and potable water plant. These small quantities will be delivered in small bags and stored as such and man-handled when required.
		Fire suppression foam	Foam chemicals will be required for the fire suppression system in high fire risk areas. The consumption will be dependent on use.
18	Diesel refilling station	The capacity of the containment area at the diesel refilling station shall be sufficient to contain the total capacities of the storage tanks. The containment walls shall have a freeboard of 30cm.	
19	Emergency	Major spillage incidents (including tailings spillage incidents from the delivery pipeline and/or TSF failure) will be handled in accordance with the Husab emergency response procedure. Any significant spills will be reported. Depending on the type of spill and its significance, it will be reported to DWA, MET:DEA and also possibly to DWNP, NUA and NRPA within 24 hrs and corrective action taken.	
20	Training and awareness	Induct all relevant employees and contractors in the mine's spillage management procedure. Train personnel who handle chemicals and reagents about the storage, handling, disposal and spill response procedure of the products relevant to their work area.	

7.5.5.2 Process Effluent

Objective: prevent pollution of surface water due from industrial effluent.

Table 7-10: Industrial Effluent Management Plan

No	Issue	Management commitment
These commitments apply to operation phase only		
1	Spillage of industrial effluent	Prevent spillages of industrial effluent. Where spillage does occur, ensure it is properly contained and cleaned up.
2		Check daily for industrial effluent spills in all areas where spills could occur (e.g. Processing Plant, TSF, etc.).
3		Report spillages as per the incident management procedure, treat contaminated area and clean up spills within 24 hours of the incident occurring.
4		Ensure that bunds are designed 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.
5	Pollution of soil and / or water when spillage or discharge occurs.	In the event of industrial effluent discharge into the environment, stop the incident (i.e. stop the source and contain the spilled material) as soon as possible and then find the root cause.
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.
These commitments apply to construction, operation and decommissioning		
7	Prevent industrial effluent from polluting the environment	Ensure that the various effluent streams (tailings decant, treated effluent dirty storm water, process effluent) are managed to prevent overflow of the process dam.
8		Ensure that a freeboard is maintained to accommodate run-off during a 1:100 year storm event in all contaminated water storage facilities.
9		Monitor the effectiveness of the mitigation measures (e.g. liner) for damage to ensure that seepage does not occur.
10	Discharge of industrial effluent ~~to the process dam and mineralised waste facilities~~	Ensure that all the industrial effluent is discharged to the appropriate facility for reuse or disposal (Evaporation where it can't be reused).
11		Install suitable oil separators at all wash bays & workshop sumps as required, to separate hydrocarbons from the water – refer to Table 11-1 for minimum requirements and maintenance of oil traps. Clean (tested and cleared for use) water to be recycled in the process or used for dust suppression. ~~Send the water to the process dam~~.
12		Skim separator regularly and dispose of hydrocarbons and related waste as per the waste management procedure.
13	Spillage of effluent	Maintain pipes, drains, pumps, valves, etc. to minimise the likelihood of leaks.
These commitments apply to construction and operation only		
14	Prevent effluent from polluting the environment	Recycle all process water from the processing dams/ponds back into the plant as per the design specifications.

No	Issue	Management commitment
15	Storage and disposal of liquid waste (hydrocarbons)	All liquid hydrocarbon waste will be collected, safely stored in sealed drums on impermeable surfaces within bunded areas. Refer to Table 11-1 for bunding minimum requirements and maintenance. The bulk fuel supplier will manage used oils and lubricants. Other unusable waste product will be kept at the temporary hazardous storage bay before appropriate disposal at the Walvis Bay landfill or incineration on site (if radioactive contaminated). Records will be kept.

7.5.5.3 Domestic Effluent

Objective: prevent pollution of surface water due to domestic effluent.

Table 7-11: Domestic Effluent Management Plan

No	Issue	Management commitment
These commitments apply to <u>construction, operation and decommissioning</u>		
1	Management of sewage and grey water	Ensure that portable facilities and septic/conservancy tanks constructed during the construction phase are managed until such time as they are no longer used and can be decommissioned.
2	Discharge of treated effluent	Use treated effluent for dust suppression during construction. Recycle the treated effluent to the lined process dam for reuse in the plant or for dust suppression (once tested and cleared for use) during the operational phase.
3		Conduct regular monitoring to ensure that treated effluent is not being discharged into the environment.
4	Spillage of domestic and treated effluent	Maintain portable facilities, pipes, drains, pumps, valves, etc. to minimise the likelihood of leaks.
5		Check daily for ~~industrial~~ domestic effluent spills in all areas where spills could occur.
6		Report spillages as per the incident management procedure and clean up spills within 24 hours of the incident occurring in line with the spillage management procedure.
7	Ablution facilities in remote areas (See also tables 7.39 to 7.45 for linear infrastructure)	Ensure that portable toilets are working properly and are cleaned at least weekly, so they do not pollute the surrounding environment or create hygiene problems.
8		Temporary camps must provide portable septic tanks that are regularly emptied by honeysucker at the onsite STP or a municipal sewage treatment facility. Ensure that sewage from the portable toilets is disposed of at either the Walvis Bay or Swakopmund sewage works.
9	Legal compliance	Apply to DWA to authorise the planned STP or any other Wastewater facility and/or activity (i.e. TSF, pit dewatering water use, etc.) as required.
10	Pollution of soil and / or groundwater when spillage occurs.	In the event of domestic effluent discharge into the environment, stop the incident as soon as possible and find the root cause.
11		In the event of soil or water pollution, decontaminate the polluted area(s) using an appropriate methodology. Once clean, rehabilitate the area.
12	Awareness and Training	Induct the relevant Husab Employees and Contractors about spill management procedures relevant to their areas of work.

No	Issue	Management commitment
13	Sewage sludge and screens	~~Sewage sludge shall be dried and disposed within the WRD or used at the bioremediation facility.~~ Transfer domestic waste screens from the STP to a registered off-site disposal site (Walvis Bay Hazardous Landfill Site) or where radioactive contaminated, to the WRD. Transfer domestic waste slurry as required from the STP to either a registered off-site disposal site (Walvis Bay/Swakopmund Municipality sewerage works), Husab Mine bioremediation site or where radioactive contaminated, dried and taken to the WRD.
These commitments apply to <u>operation and decommissioning</u> only		
14	Treatment of sewerage	Regularly service and maintain sewage plant according to the operations procedure and appointed consultant recommendations to ensure optimum performance.
15		Monitor the STP and effluent regularly to ensure that the minimum standards as prescribed by DWA are being met. Ensure all the Wastewater and Effluent permit conditions are adhered to. Update the Wastewater and Effluent permit with new activities and renew the Wastewater and Effluent permit as required (i.e. before expiry date).

7.5.5.4 Spill Management

Objective: prevent pollution of surface water due to spillages

Table 7-12: Spillage Management Plan

No	Issue	Management commitment
These commitments apply to <u>construction, operation and decommissioning</u>		
1	Dealing with spills	Obtain relevant licences for fuel facilities and provide reports on fuel storage tanks condition (as per legal requirements).
2		Hydrocarbons tanks and drums are stored inside bunded areas on impermeable floors with traps and separators for containing spillages. Refer to Table 11-1 for bunding requirements and refer to the waste management plan (section 11).
3		Ensure that all fuel and oil storage facilities (farms) and transport tankers have spill kits.
4		Ensure that the fuel transport company has a system in place to deal with hydrocarbon spills and subsequent cleanup thereof.
5		Contain any spills and commence with remediation within 24 hours. In this regard the remediation options include in situ treatment or disposal of contaminated soils as hazardous waste.
6		In cases where spills cannot be cleaned up immediately, monitor seepage into deeper soils and groundwater closely.
7		If possible, separate hydrocarbons from water if contamination occurs and treat the water before recycling and re-use.
8	Legal Compliance	Comply with all legal requirements regarding spills and containment structures.
9		Hydrocarbon spills of 200 l or more must be reported to MME in terms of Section 49 of the Petroleum Products Regulations 2000.
10	Monitoring of spills	Ensure that the monitoring of all tanks, pipelines and bunds are included in the daily inspection programme to develop an early detection system for leaks.
11		Identify post rehabilitation audit criteria for verifying that remediation has been successful.
12	Awareness and training	Induct all mine employees and contractors in the Swakop Uranium Company Policy ~~Health, Safety, Environment and Community (HSEC) Policy~~, spillage management and incident management procedures.
13		Train selected employees on containment, handling of spills and the de-contamination and rehabilitation of affected environments.
14	Emergency situations and reporting	Maintain and implement the emergency response procedure to address large scale hydrocarbon or reagent spills on and off site. Major spillage incidents must be handled in accordance with the Husab emergency response procedure.
15		Identify and contract a service provider/specialist to assist with the handling and clean up of emergency spills off site.
16		Periodically test the emergency response.
18		Where legislation is lacking regarding reporting of spillage related incidents, Swakop Uranium will implement their spill management & incident management procedures for further reporting requirements re-best practise. In this regard, any significant spills will be reported. Depending on the type of spill and its significance, it will be reported to DWA, MET:DEA and also possibly to DWNP, NUA and NRPA within 24 hrs and corrective action taken.

7.6 Groundwater Management

7.6.1 Introduction

Potential groundwater quality and quantity impacts are an issue during the construction, operation and after closure of the various mining activities and infrastructure unless measures are undertaken to prevent and mitigate such impacts. The purpose of this groundwater management and mitigation plan is to provide methods to be followed to achieve such mitigation.

7.6.2 SEMP Requirements

The SEMP aims to ensure that the public have the same or better access to water in future as they have currently, and that the integrity of all aquifers remains consistent with baseline conditions. The quantity and quality of groundwater should not adversely affected by mining activities. The relevant targets and indicators set by the SEMP are tabled below.

Table 7-13: SEMP Water Related Targets and Indicators

Target	Indicators
The Uranium Rush must not compromise communities access to appropriate quality water	Aesthetic/physical, inorganic and bacteriological determinants must conform to minimum required quality as prescribed in the national water quality standards.
The Uranium Rush must not compromise groundwater movement and availability.	• Borehole levels may fluctuate only within existing norms. • Aquifer water will be made available to domestic users at approved NamWater rates. • All water supply infrastructure must be maintained. • Disaster management plans must are in place and implemented.
Additional water resources must be developed to meet industrial demand	• Desalinated water must meet mine demand by 2011. • No industrial investor may be lost because of water unavailability. • Water availability exceeds 99 % of demand.

7.6.3 EIA Commitments

The following commitments are derived from the various Husab mine and associated linear infrastructure EIA reports concerning groundwater management:

Dewatering

- It is probable that no mitigation will be required because of the low impacts that have been predicted. Even so, as a confirmatory measure, the mine ~~will~~ has established additional monitoring boreholes, with the input of a groundwater specialist, to monitor the influence of dewatering on the water levels in the Khan River. If greater impacts (than predicted) are observed, appropriate measures will be formulated and implemented by the mine in consultation with a groundwater specialist and the Department of Water Affairs (DWA).

  The groundwater model will be routinely updated to take account of updated geological information and to improve the understanding and management of water related issues. This updating should be done every two years and mitigation and management measures adjusted according to updated modelled results.

Groundwater contamination

- The TSF will be constructed in accordance with the environmental protection design measures described in Table 7-14 below. Key aspects of this design are water pollution control measures including an engineered synthetic liner and seepage collection system.
- Monitoring boreholes will be placed around the perimeter of the TSF and further downstream to enable the mine to identify any potential contamination movement.
- If contamination movement is observed measures will be implemented to actively capture polluted water and to direct this either back into the process water circuit or into the open pit(s). Pollution control measures at source (such as deep cut off trenches) may also be required.
- The groundwater model will be routinely updated to take account of updated geological information and to improve the understanding and management of water related issues. This updating should be done every two years and mitigation and management measures adjusted according to updated modelled results.
- Given that the dewatering effect of the pits is key to the long term deep water pollution control, additional measures to enhance this effect may be considered if future mine planning results in a reduced pit depth or other factors result in a change to the model and a reduced dewatering effect.
- As part of closure planning, the closure designs of any permanent and potentially polluting structures (mineralised waste facilities) will consider the requirements for long term deep aquifer water pollution prevention and confirmatory monitoring. This will require full capping of the TSF and may also require active monitoring and management interventions that have to be implemented for as long as contamination concerns exist (i.e. shallow monitoring boreholes intersecting the unsaturated alluvial channels underlying the WRD, TSF and permanent cut-off trenches). Should contamination concerns exist for 200 years, it still remains the responsibility of Swakop Uranium.

7.6.4 Relevant Activities that could Impact on Groundwater

Construction	Operational	Decommissioning – cumulative	Closure - cumulative
Storage and handling of new and used materials, chemicals and hydrocarbons. Waste management (non-mineralised) Sanitation. Servicing equipment. Abstraction of groundwater from the Ida Dome compartment, or base flow of the Swakop River.	Mining development Ore processing. Servicing equipment. Dirty water management and related facilities. Storage and handling of new and used materials, chemicals and hydrocarbons. Waste management (mineralised and non-mineralised) Stockpile development Sanitation Pipelines Pit dewatering	Servicing equipment Storage and handling of new and used materials, chemicals and hydrocarbons. Waste management (mineralised and non mineralised) Sanitation Stockpiles and waste facilities Dirty water management and related facilities	Remaining infrastructure – surface water management system, mineralised waste and stockpiles

7.6.5 Management Plan

Objectives:

- Prevent quantity and quality impacts to users of the Khan River alluvial aquifer.
- Prevent quality impacts in the Swakop River.
- Prevent impacts to the riparian habitat in the Swakop River Ida Dome compartment from where water is to be abstracted.
- Prevent water quality impacts from the WRD amendments that could cause impacts to downstream recipients (Welwitschias).

Table 7-14: Groundwater Management Plan

No	Issue	Management commitment
These commitments apply to the design phase only		
1	Pollution of groundwater	The TSF will be constructed in accordance with the environmental protection design measures described in Table 7-26.
These commitments apply to construction only		
2	Abstraction from boreholes along the Swakop River	Obtain an abstraction permit from DWA before abstracting groundwater from boreholes along the Swakop River or anywhere else, and adhere to permit conditions.
3		A maximum amount of 0.5 Mm^3/annum will be abstracted from the boreholes (or as per the permit conditions) and subsurface cumulative impacts will be monitored.
4		For each abstraction borehole, a downstream monitoring borehole will be installed and monthly monitoring of the sub surface water levels will be conducted.
5		Water levels in the alluvial aquifer may not drop more than 10 cm per month.
6		Regular ~~Monthly~~ monitoring of riparian tree health will also be conducted (possibly by using physiological parameters such as xylem pressure). Also, regular monitoring of the physical parameters (i.e. canopy, flowers, etc.).
7		If borehole water level monitoring shows that the water levels have dropped by more than 10 cm and that the trees show signs of stressing, then abstraction rates will be adjusted down or stopped on the advice of a groundwater specialist.
8		If riparian tree health monitoring shows that the riparian trees are struggling to survive then abstraction rates will be adjusted down or stopped on the advice of a botanist. Alternatively, the affected trees will be watered regularly
9		The water level and riparian tree monitoring data will be kept. Data may be made available to other scientists to assist with the understanding of the water dynamics of riparian trees and the limit thresholds of extraction rates and water depths.
10		With the approval of the DWAF, a weed and exotic species eradication plan will be developed and implemented within the IDC, with particular attention to *Prosopis* species.
These commitments apply to operations only		
11	Pit dewatering	Monitor the volume of water dewatered from the pit on a continuous basis and keep accurate records of these volumes.
12		Update the site wide water balance and the groundwater model at least every two years ~~annually~~ using dewatering monitoring data.

No	Issue	Management commitment
13		Establish additional monitoring boreholes, with the input of a ground water specialist, to monitor the influence of dewatering on the water levels in the Khan River. If greater impacts (than predicted) are observed, appropriate measures will be formulated and implemented by the mine in consultation with a groundwater specialist and the Department of Water Affairs.
14		Springs and seeps situated at the slopes towards the Khan River should be registered and monitored on a regular basis.
These commitments apply to <u>construction, operation and decommissioning</u> only		
15	Pollution of groundwater	Monitoring boreholes will be placed around the perimeter of the TSF and further downstream to enable the mine to identify any potential contamination movement. Additional monitoring boreholes have to be drilled at the WRD perimeter where currently not existing – refer to Section 9. If contamination movement is observed measures will be implemented to actively capture polluted water and to direct this either back into the process water circuit or into the open pit(s). Any leakage through the liner or side walls must be captured by trenches and/or recovery wells to be drilled into the weathered zone. Freeboard for the TSF must always be sufficient to capture extraordinary rainfall events.
16		Seepage from the top-of liner collection system from the TSF cannot easily be directed by gravity to the mine pits and thus seepage water must be pumped for a considerable period of time after mine closure.
17		The groundwater model will be routinely updated (every 2 years as a minimum) with new geological information to improve the understanding and management of ground water. Mitigation and management measures can be adjusted according to updated modelled results.
18		Prevent pollution through basic infrastructure design and through education and training of workers (permanent and temporary).
19		Sustainable deep ground water pollution control is dependent upon the drawdown cone of the pits. Alternative sustainable engineering solutions should be investigated during the LOM to try and enhance this effect.
20	Emergencies	Major spillage incidents (including tailings spillage incidents from the delivery pipeline and/or TSF failure) will be handled in accordance with the Husab emergency response procedure.
These commitments apply to <u>construction, operation and decommissioning</u> only		
21	Closure planning	The closure planning designs of any permanent and potentially polluting structures (mineralised waste facilities) must consider the requirements for long term deep aquifer water pollution prevention and confirmatory monitoring, including the long term active monitoring and management interventions, and make financial provision for this.
These commitments apply to <u>design, operation and decommissioning</u> phases		
22	The diversion of the Husab Drainage Channel around the expanded WRD causes pollution of the	A cut-off trench across the Husab Drainage Channel to be excavated and filled with calcrete, calc-silicate and/or other acid neutralizing material, thereby effectively preventing contaminated groundwater in the alluvial channel underlying the WRD from reaching the alluvium in the downstream Welwitschia area, depending monitoring results of the shallow alluvium.

No	Issue	Management commitment
23	shallow alluvium (in the Husab Drainage channel) from infiltrating flood water from the waste rock dumped over the channel	The trench, or passive barrier, needs to be properly designed and its functionality tested as part of the proposed engineered river diversion design study. The location of the cut-off trench could be where the channel reappears on the downstream side of the WRD.
24	Flood waters in the Husab drainage infiltrate in the river diversion channel, reducing the flood volumes reaching the downstream Welwitschia fields	The diversion channel floor should be compacted to prevent increased infiltration of flood water. Large sections of the diversion channel will intersect the impermeable calcrete layer and it is assumed that infiltration in that sections will be limited or even lesser than in the natural alluvial channel.
25		Monitoring gauges, measuring the flood volume and (temporary) groundwater levels in the alluvial channel, should be installed upstream and downstream of the diversion channel to quantify transmission losses and assess the necessity for further mitigation measures. Erosion should also be monitored and improvements should be made where identified.
26		Construct and run several vertical 2D models to simulate unsaturated flow and transport using a source-pathway-receptor methodology to determine the concentration and seepage rates for targeted receptors.

7.7 Air Quality Management

7.7.1 Introduction

There are a number of sources in all phases that have the potential to pollute the air. In the construction and decommissioning phases these potential pollution sources are temporary in nature, usually existing for a few weeks to a few months. The operational phase will present more long term potential sources and the closure phase will present final land forms that may have the potential to pollute the air through long-term wind erosion.

The EIAs showed that the more significant emissions are - inhalable particulate matters less than 2.5 microns in size (PM2.5), inhalable particulate matters less than 10 microns in size (PM10), larger total suspended particulates (TSP) and radio-active component of both PM10 and TSP. There are also limited gas emissions to be managed.

7.7.2 SEMP Requirements

The SEMP set the objective that workers and the public must not suffer significant increased health risks as a result of radiation exposure from the Uranium Rush. Detailed targets have been set to achieve this and are tabled below with the relevant monitoring indicators.

Table 7-15: SEMP Air Quality Targets and Indicators

Target	Indicators
• Increments in the concentrations of uranium, thorium and health-relevant nuclides of the uranium, thorium and actinium decay chains (above respective background concentrations) in air, surface and groundwater that originate from uranium mines, must be constrained so that the cumulative radiation dose to members of the public does not exceed 1 mSv per annum above background. • More accurate public dose assessments shall demonstrate that the cumulative radiation dose to members of the public does not exceed 1 mSv/a, or that the dose to members of the public does not exceed 0.25 mSv/a for contributions from any single operation.	• Monitor radon exhalation rates from ground through continuous monitoring. • Gross alpha/beta-analysis and determination of Uranium and Thorium by NAA within the inhalable (PM10) fraction of air filters Gross alpha/beta-analysis and determination of Uranium and Thorium by NAA within dust fallout samples.
• Ambient PM10 concentrations at public locations 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. • 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. • PM10 samplers can be implemented by individual mines to track progress with mitigation measures. PM10 samplers should not be placed close to main dust generating sources at the mine but rather some distance away within the main zone of impact. • Public roads that will act as main access routes to mining operations should be paved or changed into salt roads. This will reduce dust generation from these roads	• Ambient PM10 monitoring at Swakopmund, Walvis Bay, Arandis, Goanikontes and Henties Bay. • Installation of an accredited meteorological station at Swakopmund. • Calibration of PM10 samplers and meteorological station as per manufacturer's specification • Use of accredited laboratories in the analysis of PM10 sample filters. • Quality checks must be performed on meteorological data. • Development of a monitoring database providing information on measured PM10 concentrations and dust fallout levels. This information should be available to the public in a format that is both scientifically sound and understandable.
• Dust fallout levels outside of mining license areas should not exceed the recommended limit of 600 mg/m^2/day.	• Continuous dust fallout measurements on a regional scale e.g. continuation of the existing SEA dust fallout network. • All mining operations should implement a dust fallout network on-site measuring dust fallout at the main dust generating sources and along the mine boundary.

7.7.3 EIA Commitments

The following commitments are derived from the various Husab mine and associated linear infrastructure EIA reports concerning air quality management:

- Implement dust management for the main impact sources: dust entrainment on unpaved roads, crushing and screening operations and material handling points.
- The TSF side walls will be covered with inert waste rock/overburden (and rip-rap will be placed on the side slopes) as the side walls are raised. During decommissioning the TSF surface will also be capped.
- The meteorological, PM10 and TSP monitoring programme will continue and the TSP dust buckets have been moved to take account of the changes in infrastructure layout. In addition, the mine will implement a source-based dust fallout performance indicator of less than 1 200 mg/m^2/day in the immediate vicinity of the roads, the crushing operation; the material tipping points and the mineralized waste facilities.
- Quarterly ~~performance audits and~~ inspections will be done to verify that the monitoring is taking place according to specifications and that the mine is adhering to the source based indicators.
- If used, diesel generators will be operated and maintained according to supplier specifications and the International Finance Corporation emission limits.
- The air monitoring programme will be expanded to cover:
  - The metal content ~~radio-nuclide components~~ of the TSP and PM_{10}.
  - Radon gas emissions concentration and rates (flux) from key sources (mineralised waste facilities, mineralised stockpiles, pits, radioactive non-mineralised waste).
  - Additional sampling of the radionuclide content of the relevant radioactive dust sources to validate the data used by the NECSA 2010 study and to assist with closure planning.
  - Ambient radon gas concentrations in and adjacent to the proposed project site.
  - Every two (2) year's a survey to be conducted to test the radionuclide component of soils in relation to dust bucket sites in the ML & EPL's.
- As part of closure planning the designs of any permanent and potentially polluting structures (particularly the mineralized waste facilities) will, on the basis of impact modelling, incorporate measures to address long term pollution prevention and confirmatory monitoring.

7.7.4 Relevant Activities

Construction	Operational	Decommissioning	Closure
Soil stripping Overburden removal Cleaning and grubbing Preparation of the foundations Compacting bases Opening borrow pits and trenches General building activities Slope stabilization Building internal linear infrastructure Vehicle movement and exhaust fumes	Soil stripping Overburden removal Drilling and blasting Crushing and screening Vehicle movement and exhaust fumes Soil management activities Mineralised waste management Stockpile development Conveyors Acid plant Diesel Generators	Removal of infrastructure Vehicle movement and exhaust fumes General material handling Soil management activities General building activities Mineralised waste management Slope stabilization Diesel Generators	Remaining infrastructure – surface water management system, mineralised waste, Vegetation establishment and maintenance

Construction	Operational	Decommissioning	Closure
Diesel generators limited drilling and blasting for mining	General materials handling Incinerator activities		

7.7.5 Management Plan

This management plan is made up of the following components:

- Dust management.
- Gaseous emissions management.

Radiological dust issues will be dealt with in the radiological management plan (refer to section 7.13).

7.7.5.1 Dust Management

Objective: prevent unacceptable air quality related pollution impacts.

Table 7-16: Dust Management Plan

No	Issue	Management commitment
These commitments apply to construction, operation and decommissioning		
1	Weather data	Husab must continue to measure on-site meteorological data.
2	Dust entrain-ment on unpaved roads	Dust suppression will be undertaken through chemical binding agents and/or water sprays combined with vehicle speed controls on permanent haul and temporary in-pit roads to achieve a control efficiency of 90 % and at least 75 % respectively. Monitor fall out dust in the immediate vicinity of the roads. Keep level at less than 1 200 mg/m^2/day.
3	Dust from crushing & screening	Dust will be controlled at the crushing and screening operation through sprays and / or the use of hoods with filters or scrubbers to achieve a control efficiency of 83 %. Measure fallout dust near the crushing operation and keep levels below 1 200 mg/m^2/day.
4	Dust from material transfer	Dust will be controlled at material handling points (loading and offloading) by water sprays to achieve 50 % control efficiency. Measure fallout dust in the vicinity of the material transfer points and keep levels below 1 200 mg/m^2/day.
5	Dust from the TSF	The TSF side walls will be covered with inert waste rock/overburden (and rip-rap will be placed on the side slopes) as the side walls are raised. During decommissioning the TSF surface will also be capped.
6	Auditing	Quarterly ~~performance audits and~~ inspections will be undertaken to assess efficacy of the dust suppression methods.
These commitments apply to <u>design, construction and closure phases</u>		
7	Potentially polluting structures	As part of closure planning the designs of any permanent and potentially polluting structures (particularly the mineralized waste facilities) will incorporate measures to prevent long term pollution and the monitoring thereof. Financial provision must be made for post closure activities.
These commitments apply to <u>all phases</u>		

No	Issue	Management commitment
8	Monitor TSP, $PM_{2.5}$ and PM_{10} concent-rations	The $PM_{2.5}$, PM_{10} and TSP monitoring program will continue with modifications to the monitoring points to account for the infrastructure layout, vegetation and linear infrastructure monitoring requirements and/or infrastructure changes e.g. incinerator, WRD expansion. In addition, the PM_{10} and TSP monitoring program will be expanded to cover radiological monitoring at the same dust monitoring points (refer to section 9.3).
9		The collection and analysis of dust fall out must be done in accordance with relevant standards. Data should be analysed and appropriate action taken to correct non-conformances of monitoring sites, also taking natural phenomena such as east wind condition, etc. into consideration.

7.7.5.2 Gaseous Emissions Management

Objective: minimise gas emissions.

Table 7-17A: Gaseous Emissions Management Plan

No	Issue	Management commitment
These commitments apply to <u>Operations only</u>		
1	Green house gas emissions	Develop a green house gas emissions inventory if found feasible and calculate the mine's annual emission of greenhouse gases.
2		Periodically investigate ways to decrease the mine's emission of greenhouse gases.
3		Where appropriate, implement initiatives to decrease the volume of green house gasses emitted to air.
4	Emissions from diesel generators	The backup diesel generators will be operated and maintained according to supplier specifications.
5	Acid plant emissions	The acid plant will be equipped with gas cleaning equipment that achieves the stated 99 % pollution removal design efficiency.
6	NO_x, SO_2 and VOCs	Measure NO_x, SO_2 and VOC emissions to develop a baseline in areas where emissions may impact the environment.
7	Gas emissions	Report large/major gas leaks and/or emissions to the relevant authorities. Activate emergency procedures during the event of a gas emission (i.e. SO_2, SO_3, Ammonia, etc.). Ensure appropriate detection systems are in place to alert appropriate personnel of a gas leak or emissions event. Incorporate incidents or events information into the air quality monitoring database (i.e. possibly explain spikes in readings/data).

7.7.5.3 Management and mitigation measures relating to the on-site waste incinerator

A pollution control system (PCS) to be installed and operated with the incinerator that will meet the below emissions limits.

Table 7-17B: In site Waste Incinerator Emission Limits

Description:	Facilities where general and hazardous waste are treated by the application of heat.
Applications:	All installations treating 10 kg per day of waste.

Substance or mixture of substances		Plant status	mg/Nm³ under normal conditions of 273 K and 101.3 kPa.
Common name	Chemical symbol		
Particulate matter	N/A	New	10
Carbon monoxide	CO	New	50
Sulphur dioxide	SO_2	New	50
Oxides of nitrogen	NOx expressed as NO_2	New	200
Hydrogen chloride	HCl	New	10
Hydrogen fluoride	HF	New	1
Sum of Lead, arsenic, antimony, chromium, cobalt, copper, manganese, nickel, vanadium)	Pb + As + Sb + Cr + Co + Cu + Mn + Ni + V	New	0.5
Mercury	Hg	New	0.05
Sum of Cadmium, Thallium	Cd + Tl	New	0.05
Total organic compounds	TOC	New	10
Ammonia	NH_3	New	10
Common name	**Chemical symbol**	**Plant status**	**ng-iTEQ/Nm³ under normal conditions of 10% O_2, 273 K and 101.3 kPa.**
Dioxins and furans	PCDD/PCDF	New	0.1

The Incinerator operational requirements play a vital role in its effectivity and therefore associated with gas emissions. The incinerator shall be operated to manufacturer's specification and at optimum combustion conditions. However, it is essential that the emissions from the waste incinerator do not exceed the adopted emissions limit. It is therefore recommended that a stack emission measurement campaign be conducted once the proposed waste incinerator is fully operational. This is to confirm that the emissions fall within adopted emissions limit.

7.8 Soil Management

7.8.1 Introduction

The physical loss of soils and/or the loss of soil functionality are important issues because as an ecological driver, soil is the medium in which most vegetation grows and a significant range of vertebrates and invertebrates exist. In the context of mining, it is even more of an issue if one considers that mining is a temporary land use where-after rehabilitation is the key to re-establishing post closure land capability that will support conservation and ecotourism type land uses. Soil is a key part of rehabilitation.

Soil can be impacted upon in the following manner by the proposed project:

- Loss of soil resources through pollution.
- Loss of soil resources through physical disturbance.

- Topsoil stockpiling/management.

7.8.2 SEMP Requirements

No soil related objectives or targets have been set in the SEMP.

7.8.3 EIA Commitments

The following commitments are derived from the various Husab mine and associated linear infrastructure EIA reports with regards to soil management:

- Ensure that all hazardous chemicals (new and used), dirty water, mineralised wastes and non-mineralised wastes are handled in a manner that they do not pollute soils.
- Limit the disturbance of soils to what is absolutely necessary both in terms of site clearing and in terms of ongoing project development and use of vehicles.
- Where soils have to be disturbed the soil will be stripped, stored, maintained and replaced in accordance with the specifications of the topsoil management plan.
- Prevent pollution prevention through basic infrastructure design and through education and training of workers (permanent and temporary).
- Implement the required steps to enable fast reaction to contain and remediate pollution incidents, pollution prevention through basic infrastructure design and through education and training of workers (permanent and temporary).
- Develop specifications for post rehabilitation audit criteria to ascertain whether the remediation has been successful.
- As part of closure planning, the designs of any permanent and potentially polluting structures (mineralised waste facilities) will take account of the requirements for long term pollution prevention and confirmatory monitoring.
- Even though the footprint of the open pit and mineralised waste facilities will never be rehabilitated, some topsoil should be stripped and stored from these areas (except the TSF which requires the soils as a subgrade for the laying of the liner) because this valuable resource can be used elsewhere on the site for rehabilitation. In this regard, experience has shown that very few mines ever have enough topsoil for rehabilitation.
- If required, pilot studies will be undertaken during the operation phase to determine the best method of re-creating the subsurface impermeable layer (in its natural form this is calcrete but it may be possible to recreate it with similar material) and crust layers, and restoring their role as ecological drivers.
- Emergency situations: Major spillage incidents will be handled in accordance with the Husab emergency response procedure.

7.8.4 Relevant Activities

Construction	Operational	Decommissioning	Closure
Soil pollution			
General construction activities Cement mixing Management of dirty water Storage and handling of new and used materials, chemicals and hydrocarbons. Waste management	Servicing equipment Management of dirty process water/effluent Storage and handling of new and used materials, chemicals and hydrocarbons. Waste management (mineralised and	General building activities Management of dirty water Storage and handling of new and used materials, chemicals and hydrocarbons. Waste management (mineralised and non-	Seepage and run-off from remaining mineralised waste landforms

Construction	Operational	Decommissioning	Closure
(non-mineralised) Equipment servicing Use of vehicles and equipment that may leak lubricants and fuel	non-mineralised)	mineralised) Equipment servicing Use of vehicles and equipment that may leak lubricants and fuel	
Soil disturbance			
Soil stripping Cleaning and grubbing Preparation of the foundations Compacting bases Opening borrow pits and trenches General building activities Slope stabilization Building roads Vehicle movement Developing open pit	Mining development Vehicle movement Stockpile development Mineralised waste development Exploration	Soil stripping Cleaning and grubbing Material movement General building activities Slope stabilization Vehicle movement	Erosion of final land forms

7.8.5 Management Plan

This plan is made up of the following components:

- Loss of soil resources through pollution and physical disturbance.
- Topsoil stockpiling/management.

7.8.5.1 Soil Pollution and Physical Disturbance Management

Objectives:

- Prevent soil pollution and mitigate accidental spills.
- Prevent the loss of soils and related functionality through physical disturbance, erosion and compaction.

Table 7-18: Soil and Physical Disturbance Management Plan

No	Issue	Management commitment
These commitments apply to <u>construction, operation and decommissioning</u> phases		
1	Soil pollution	Ensure that all hazardous chemicals (new and used), dirty water, mineralised wastes and non-mineralised wastes are handled in a manner that they do not pollute soils. This will be implemented through one or more procedure(s) covering the following: • Pollution prevention through basic infrastructure design and through education and training of workers (permanent and temporary). • Implementation of first response teams to contain and remediate pollution incidents. • Establishment of a bioremediation facility to rehabilitate contaminated soils on site. Remediated soil will then be replaced. Specifications for post rehabilitation audit criteria will be developed as part of detailed closure planning to ascertain whether the remediation has been successful.
2	Long term pollution	The designs of any permanent and potentially polluting structures (mineralised waste facilities) will take account of the requirements for long term pollution prevention and confirmatory monitoring.
3	Soil resource management	A soil management plan will be implemented. The key components are: • Limit the disturbance of soils to what is absolutely necessary. • Where soils have to be disturbed the soil will be stripped, stored, maintained and replaced in accordance with the specifications of the Topsoil Management Plan. If required, pilot studies will be undertaken during operations to determine the best method of re-creating the subsurface impermeable layer (in its natural form this is calcrete but it may be possible to recreate it with similar material) and crust layers, and restoring their role as ecological drivers.
4		Remove and store sufficient quantities of topsoil from beneath the infrastructure footprints to ensure adequate resource for rehabilitation and closure.
5		As part of closure planning, the designs of any permanent structures (mineral waste facilities) will take into account the requirements for long term erosion prevention and confirmatory monitoring.
6		Implement the Topsoil Management Plan provided below.
7	Emergency	Major spillage incidents will be handled in accordance with the Husab emergency response procedure.
These commitments apply to the <u>construction</u> phase		
8	Construction material	Construction materials will come from various sources; • Pit area - overburden (this is material from about 1-3m). • Cut-offs or spoil of rocky areas and road reserve materials (this is the materials either cleared out of the road reserve, be it sand where the road is within the river or levelled outcrops) • Other identified and approved borrow pits along the permanent road, and • Commercial sources outside of the park.

7.8.5.2 Topsoil Stockpiling/management

Objective: Ensure that all topsoil stripping, stockpiling and replacement operations will be undertaken in a manner that limits impacts on the soil functionality and ensure it can be used for rehabilitation as and when required.

Table 7-19: Topsoil Management Plan

No	Issue	Management commitment
These commitments apply to <u>construction and operation phases</u>		
1	Delineation of stockpiling areas Stockpile management (See also tables 7-39 to 7-45 for linear infrastructure commitments)	Limit the disturbance of soils to what is absolutely necessary.
2		Stockpiling areas will be identified as far as practically possible in close proximity to the source of the soil.
3		Soil stockpiles will be demarcated, and clearly marked to identify both the soil type and the intended area of rehabilitation.
4		Toward the end of life of mine, initiate trial studies on the use of fertilizers and certain erosion control measures as effective soil management tools.
5		Options for preventing erosion of stockpiles could include recreating the crusty layer, dust palliatives, rock cladding or establishment of vegetation.
6		Soil stockpiles heights will be restricted where possible to a maximum of 20 m height with 1.5 m high and 2 m wide benches. Soil stockpiles heights for linear infrastructure will be restricted to a maximum of 2 m.
7		For storage periods greater than 3 years, erosion control is essential, and will be implemented. The stockpile sides should as far as practically possible, be stabilised as a slope of 1 in 6 or less.
8		No waste material will be placed on the soil stockpiles.
9		Equipment movement on top of the soil stockpiles will be limited as far as possible.
10	Monitoring	Undertake regular monitoring of soils (stockpiles, in its natural state and rehabilitated areas) to ensure effective implementation of protection measures.
11	Protection of biodiversity	Adhere to all requirements for moving and preserving fauna and flora according to the biodiversity management plan, and land use procedures.
12	Stripping and handling of soils (See also tables 7-39 to 7-45 for linear infrastructure commitments)	Handle soils in dry weather conditions as far as possible so as to cause as little compaction as possible.
13		The soil stripping depth will be 300 mm beneath the plant, haul roads and other surface structures, where practical. However, only a proportion of the topsoil under the WRD and from the pits will be stripped for use in rehabilitation of mine infrastructure as it cannot be stored effectively.
14		Utilizable soil (topsoil and upper portion of subsoil B2/1 Horizon), the lower "B" horizon (subsoil) and all softs (decomposed rock - soft overburden) should be handled and stockpiled separately, where practical.
15		The utilizable soil will be stripped and stockpiled together with any vegetation cover present.
16		Where possible, consider sequential restoration so that fresh topsoil is used to rehabilitate areas thereby limiting the need to create stockpiles for lengthy periods of time.
These commitments apply to <u>decommissioning</u>		

No	Issue	Management commitment
17	Restoration of disturbed land and restoration of soil utilisation	Stockpiled soil will be used to rehabilitate disturbed sites. Either ongoing as disturbed areas become available for rehabilitation and/or at closure. The soil removed during the construction phase will be replaced to an approximate thickness of 300 to 500 mm and will be free draining. End land use is low intensity wildlife grazing.
18		A representative sampling of the stockpiled topsoils will be analysed prior to use or closure, to determine its nutrient status. As a minimum the following elements will be tested for: EC, CEC, pH, Ca, Mg, K, Na, P, Zn, Clay % and Organic Carbon. These elements provide the basis for determining the fertility of soil. Based on the analysis, fertilisers will be applied if necessary.
19		Erosion control measures will be implemented to ensure that the soil is not washed away and that erosion gulleys do not develop prior to application of erosion measures or vegetation establishment.
20	Pollution of soils	If soil (whether stockpiled or in its undisturbed natural state) is polluted, the first management priority is to treat the pollution by means of in situ bioremediation. If in situ treatment is not possible or acceptable, then the polluted soil must be regarded as hazardous waste and disposed at an appropriately permitted, off-site waste facility.

7.9 Visual Aspect Management

7.9.1 Introduction

Visual impacts may be caused by activities and infrastructure in all mine phases. Views from the Welwitschia Fields and road to the Big Welwitschia and associated tourist attractions present the greatest visual exposure.

7.9.2 SEMP Requirements

The SEMP set the objective that the natural beauty of the desert and its sense of place must not be compromised unduly by the Uranium Rush; and to identify ways of avoiding conflicts between the tourism industry and prospecting/mining, so that both industries can coexist in the central Namib. The relevant targets and indicators are tabled below.

Table 7-20: SEMP Visual Related Targets and Indicators

Target	Indicators
Direct and indirect visual scarring from the Uranium Rush must be avoided or kept within acceptable limits	All developers must commission EIAs prior to final design, and outcomes-based EMPs guide implementation and decommissioning. In all cases, visual impacts and sense of place must be addressed Tour operators must continue to regard areas such as the dunes, the coastline, Moon Landscape, Welwitschia flats, Swakop and Khan River areas, and Spitzkoppe as a 'significant' component of their tour package Tourists expectations are 'met or exceeded' more than 80 % of the time in terms of their visual experience in the central Namib.

Target	Indicators
Improved protection of listed areas.	MET recognises the following areas have been "red flagged" and are regarded as being significantly beautiful: • Coastal strip. • Major dunefields. • Moon Landscape. • Spitzkoppe. • Brandberg. • Messum crater. • Sandwich harbour. • Rivers, notably the Khan, Swakop and Kuiseb. The following areas have been "yellow flagged" and are regarded as being scenically attractive: • Gravel plains. • Inselbergs (other than those listed above). • River washes (other than rivers listed above). • Lichen fields.

7.9.3 EIA Commitments

The following commitments are derived from the EIA Reports (Metago, 2010; Metago, 2011, SLR 2013 and SLR 2018) concerning visual aspects:

- Land disturbance will be limited to what is absolutely necessary.
- Use paint colours that reflect natural colours of the surrounding landscape where possible.
- Avoid harsh, angular and steep slopes in the shaping of any structures at closure and care should be taken to integrate these structures into the surrounding landscape where possible. A professional landscape architect will be commissioned to assist with closure planning especially for the final landforms.
- Manage all dust plume sources (except for blasting).
- Only use night lights where necessary and illuminate only that which requires illumination. The use of standard high pole flood lights should be avoided.
- Prevent littering.
- Subject to approval by MET (DWNP), the perceptions and sensitivity of the tourist viewers from the Welwitschia tourist attraction sites will be managed by the placement of tourist information boards about the mine and its visible infrastructure.
- In line with the SEA (IAEA 2010) recommendations, alternative equivalent tourist attractions (outside of the visual impact zone) will be identified if possible for the Welwitschia related attractions. If such alternatives are identified, Swakop Uranium will contribute to the establishment of these alternative attraction sites and associated access routes as a form of visual impact offset.
- A significant portion of the permanent water supply pipeline will be buried and all associated above ground facilities (pump station, valves, 3311kV power line) will be positioned to limit the visual impact;
- Rehabilitation of areas will be done as soon as possible after the temporary and permanent infrastructure is no longer in use;
- Where possible, and practical, dust plume sources will be managed with dust suppressants and water sprays to limit visual intrusion by dust resulting from linear infrastructure activities.

7.9.4 Relevant Activities

Construction	Operational	Decommissioning	Closure
Foundations Trenches Stockpiles Scaffolding Cranes Borrow pits Roads Power lines Pipelines Lights Temporary camps Blasting activities	Open pits Stockpiles Mineral waste facilities Water dams Processing plant Voids Trenches Buildings and equipment Pipelines Power lines Conveyors Lights Blasting activities	Open pits Stockpiles Mineral waste facilities Water dams Processing plant Voids Trenches Scaffolding Cranes Piles of rubble Piles of scrap Pipelines Power lines Conveyors Lights Blasting activities (possibly)	Permanent mineral waste facilities Permanent stockpiles Open pits

7.9.5 Management Plan

Objective: Limit excessive visual impacts and mitigate where appropriate.

Table 7-21: Visual Disturbance Management Plan

No	Issue	Management commitment
These commitments apply operation and decommissioning only		
1	Aesthetics or visual impacts relating to final land forms	Conduct topographical sculpting as part of rehabilitation so that the permanent structures blend, as far as is practically possible, in with the natural topography of the surrounding area.
2		In the shaping of any structures that will remain after closure, harsh, angular and steep slopes should preferably be avoided and care should be taken to integrate these structures into the surrounding landscape. A professional landscape architect could be commissioned to assist with closure planning especially for the final landforms.
3		Refer to the conceptual rehabilitation and closure plan (section 6.3) for details on closure
These commitments apply to the construction, operation and decommissioning		
4	Minimising visual impacts	Land disturbance should be limited to what is absolutely necessary.
5		Manage all significant mine related dust plume sources with dust suppressants to limit visual intrusion by dust in line with the air quality management plan (refer to section 7.7).
6		The use of night light will be kept to a minimum and will illuminate only that which is required. The use of standard high pole flood lights will be avoided as far as possible without compromising safety.
7		Prevent littering.
8		Consider visual impacts when planning location of dumps and stockpiles.
9		Subject to approval by MET (DWNP), the perceptions and sensitivity of the tourist viewers from the Welwitschia tourist attraction sites will be managed by the placement of tourist information boards about the mine and its visible infrastructure.
10		Alternative equivalent tourist attractions (outside of the visual impact zone) will be identified if possible for the Welwitschia related attractions. If such alternatives are identified, Swakop Uranium will contribute to the establishment of these alternative attraction sites and associated access routes as a form of visual impact offset.
11		Linear infrastructure visual commitments can be found in Tables 7-39 to 7-45

7.10 Waste Management

7.10.1 Introduction

Waste is generated during all phases of the mine. This management plan deals with solid waste management, providing measures to manage waste relating to:

- Non – mineralised waste: waste from industrial and domestic sources; hazardous and non hazardous waste; radioactive contaminated and non contaminated waste.
- Mineralised waste: waste rock, low grade ore, tailings.

Liquid waste (effluent) is dealt with under the surface water/stormwater management plan.

7.10.2 SEMP Requirements

The SEMP sets four objectives regarding waste management:

- To ensure that there is sufficient capacity in the existing licensed waste disposal sites to accommodate the amount of waste that will be generated by the mines without causing pollution to the air, soil or water
- To ensure that the collection and disposal of waste is carried out in a safe, responsible and legally-compliant manner
- To ensure waste re-use and recycling is optimised
- To ensure recycling agencies have sufficient capacity to handle bigger waste streams.

The relevant targets and indicators are tabled below.

Table 7-22: SEMP Waste Management Targets and Indicators

Target	Indicators
All municipal sewage, non-hazardous and hazardous waste sites are properly designed and have sufficient capacity for next 20 years.	• Municipalities to increase the capacity of sewage works and waste sites based on predicted waste volumes. • Independent audit to be conducted to prove sufficient capacity of Walvis Bay and Windhoek hazardous waste sites; and Swakopmund, Walvis Bay, Arandis and Usakos non-hazardous sites with a 20 year life-span. • All new waste sites must undergo an EIA prior to construction and receive a licence to operate.
The management of waste sites must meet national standards.	• Waste site managers and employees must be adequately trained. • Site manifests which record all wastes, volumes and origins must be kept. • Only hazardous waste classes for which the sites are licensed may be accepted. • Water and air quality monitoring must be conducted and is compliant with relevant licences. • Municipal budgets must be sufficient to comply with the site licence requirements relating to pollution control. • Waste site operators must maintain their licence to operate. • Staffing levels in the municipal solid waste management departments must be adequate.
A sustainable waste recycling system operates in the central Namib, servicing the uranium mines and the public.	• A waste recycling depot must be established. • Waste recycling operators must have sufficient capacity to collect, transport and recycle waste in a safe and responsible manner. • Volumes of waste disposed per capita should decrease.

7.10.3 EIA Commitments

The following commitments are derived from the various Husab mine and associated linear infrastructure EIA reports concerning waste management:

- Manage all waste types in a manner that ensures the protection of water, soil and air.
- Implement an effective waste management system.

7.10.4 Management Plan

This plan is made up of the following components:

- Non-mineralised solid waste (non-mineralised).
- Waste to be incinerated.
- Mineralised waste stockpiles.
- Tailings and waste rock material.

7.10.4.1 Non-mineralised Solid Waste Management

Objective: Ensure proper storage, removal, transportation and disposal of all non-mineralised solid waste.

An inventory of the anticipated waste types for the construction and operational phase is provided in the table below.

Table 7-23: Solid Waste Inventory

Waste type	Classification
Construction Phase	
Pallets and wooden crates	General
Cable drums	General
Treated timber crates	Hazardous
Batteries, paint, solvents, tar, florescent light bulbs, empty hazardous chemical containers, oil filters, oily rags, tyres, radioactive contaminated waste	Hazardous
Used oil	Hazardous
Conveyor off-cuts	General
Scrap metal	General
Concrete waste/building rubble	General
General waste e.g. food	General
Medical waste and sanitary waste	Hazardous
Treated sewage effluent	Hazardous
Sewage sludge	Hazardous
STP Screens	Hazardous
Pipe cut offs	General
Electrical wire / components	General
Pickling and passivation waste water (Acidic)	Hazardous
Operational Phase	
Radioactive contaminated scrap	Hazardous
Radioactive rubble	Hazardous
Radioactive solids from decontamination facility	Hazardous
Waste rock	Hazardous
Low grade ore stockpile	Hazardous
Used oil and hydraulic fluid	Hazardous
Medical waste and sanitary waste	Hazardous
Batteries, paint, solvents, tar, florescent light bulbs, empty hazardous chemical containers, oil filters, oily rags, tyres, radioactive contaminated waste	Hazardous
General waste e.g. food	General
Treated sewage effluent	Hazardous

Waste type	Classification
Sewage sludge	Hazardous
Concrete rubble	General
Spend reagents (radioactive and non-radioactive)	Hazardous
Catalysts bearings (Acid Plant)	Hazardous
Pickling and passivation waste water (Acidic)	Hazardous
STP Screens	Hazardous
Ash from the onsite waste incinerator	Hazardous

Table 7-24A: Non-mineralised Solid Waste Management Plan (Applicable also to the Linear Infrastructure components)

No	Issue	Management commitment
These commitments apply <u>construction, operation and decommissioning</u> phases		
1	Waste management hierarchy	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.
2	Waste collection in work areas	Adequate skips and rubbish bins equipped with lids will be provided in relevant work areas Littering will be prohibited
3	Waste sorting and storage	A Waste Transition Yard (WTY) is established with required equipment to allow sorting and storage of waste. This will include, amongst others, examples of equipment and facilities that follow: • Temporary site offices. • Covered eating facility with seating. • Toilet facilities. • Sufficient skip loaders. • A compactor for scrap metal. • Sufficient 6 m^3 and 18 m^3 skips for waste. • Used oil and hydraulic fluid storage area within a bunded area with an oil sump. • An impermeable, bunded temporary hazardous waste storage facility with oil traps. • A sorting area. • Recyclable collection area • The entire WTY will be fenced, areas where hazardous materials are handled will have a concrete slab, bund containment wall and an oil sump. • Each waste storage area and skip will be clearly marked to be used for different waste types.

No	Issue	Management commitment			
4	Non-mineralised waste management	**Waste type**	**Waste specifics (e.g of waste types)**	**Storage facility**	**End use**
		Construction Phase			
		Non-hazardous non-radioactive contaminated solid waste (non-mineralised)	Pallets and wooden crates, cable drums, scrap metal, general domestic waste such as food and packaging	Skips in relevant work areas will be provided for different waste types. A Waste Management Contractor will remove skips regularly to the Waste Transition Yard (WTY).	Waste will be sorted at the WTY. Recyclable waste will be sent to a reputable recycling company. Some items may be distributed directly to the community such as pallets and wooden crates. Inert and non-hazardous non radioactive waste constituted of building rubble will be disposed of to a designated area to the south-west of the TSF. ~~a managed area in the footprint of the waste rock dump~~. The remainder of the waste will be transported by the Waste Management Contractor to a permitted general landfill facility in Swakopmund for disposal.
			Building rubble and waste concrete	Skips in relevant work areas will be provided for different waste types. A Waste Management Contractor will remove waste construction material / rubble.	Building rubble will be disposed of to a designated area in the waste rock dump. All waste concrete will be collected from the batching plant on a daily basis and disposed of in a designated area in the waste rock dump or at a dedicated (designed) area that is impermeable.
		Non-hazardous and hazardous radioactive contaminated solid waste (non-mineralised)	Contaminated sand, drill chips, old PPE, pipes etc.	Radioactive waste will be stored in sealed drums in work areas. A Waste Management Contractor will remove these drums regularly to the WTY.	Waste will be sorted at the WTY. Recyclable waste will be decontaminated (high pressure washing) and if successfully decontaminated will be sent to a reputable recycling company. There is no appropriate disposal site in Namibia. Radioactive waste will be disposed at recorded sites within the WRD.
		Hazardous non-radioactive contaminated solid waste	Treated timber crates, printer cartridges, batteries, fluorescent bulbs,	Hazardous waste will be stored in sealed drums in work areas. A Waste Management Contractor will remove these drums regularly to the WTY.	Hazardous waste will be disposed of at a permitted hazardous disposal site in Walvis Bay by the Waste Management Contractor.

No	Issue	Management commitment			
		(non-mineralised).	paint, solvents, tar, empty hazardous containers etc.		
			Hydrocarbons (oils, grease)	Used oil and grease 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. The appointed bulk fuel provider will manage most used oils and lubricants. The Waste Management Contractor will transfer other hydrocarbon wastes to the WTY to the temporary hazardous waste materials area.	Used oil will be sent to a reputable recycling company for recycling.
			Sewage	Sewage will be treated at the modular sewage treatment plant (STP)	Treated sewage effluent will be reused in the process water circuit or for dust suppression (once tested and cleared for use). Sewage sludge will be dried and disposed of within the WRD or at the bio-remediation facility or disposed of off-site at a licenced sewage treatment facility.
			Domestic Waste – sewerage slurry/sludge and screens	Waste receptacles will be placed that can contain the volume of waste (either a dedicated skip or wheelie bin). If screens or slurry are radioactive, this waste will be dried for the latter, and transferred to the WRD for final disposal. An alternative option is to transfer the slurry to the Husab Mine bioremediation site for treatment, before final disposal.	If screens and slurry are not classified as radioactive contaminated, they will be transferred off-site to the respective registered waste management sites in Walvis Bay and/or Swakopmund. The screens will be disposed of off-site at the Walvis Bay hazardous landfill site and the slurry at the Walvis Bay or Swakopmund Municipality Sewerage works site.
		Medical waste	Syringes, material with blood stains, bandages, etc.	Medical waste will be stored in sealed drums at the clinic. A Waste Management Contractor will remove these drums regularly to the WTY.	Medical waste will be transported by the Waste Management Contractor to a permitted/approved incineration facility ~~in Swakopmund~~ for incineration.

No	Issue	Management commitment			
	Non-mineralised waste management	**Operational Phase**			
		Non-hazardous non-radioactive contaminated solid waste (non-mineralised)	Metal Cut offs, rubber, wood, cardboard/paper, used PPE, etc.	Skips in relevant work areas will be provided for different waste types. A Waste Management Contractor will remove skips regularly to the Waste Transition Yard (WTY).	Waste will be sorted at the WTY. Recyclable waste will be sent to a reputable recycling company. Some items may be distributed directly to the community such as pallets and wooden crates. Inert and non-hazardous non radioactive waste will be disposed of at a managed area in the footprint of the waste rock dump. The remainder of the waste will be transported by the Waste Management Contractor to a permitted general landfill facility in Swakopmund for disposal.
			Building rubble and waste concrete	Skips in relevant work areas will be provided for different waste types. A Waste Management Contractor will remove skips regularly to the WRD	Building rubble will be disposed of to a designated area in the waste rock dump
		Non-hazardous and hazardous radioactive contaminated solid waste (non-mineralised)	Contaminated sand drill chips, old PPE, pipes, etc.	Radioactive waste will be stored in sealed drums in work areas.	Radioactive waste from the plant will be sorted at the plant. Contaminated waste from the mine will go directly to the waste rock dump or TSF, if required. Recyclable waste will be decontaminated (high pressure washing) and if successfully decontaminated, will be sent to a reputable recycling company. There is no appropriate disposal site in Namibia for the disposal of radioactive waste will be disposed at recorded sites within the WRD.
		Hazardous non-radioactive contaminated solid waste (non-mineralised).	Printer cartridges, batteries, fluorescent bulbs, etc.	Hazardous waste will be stored in sealed drums in work areas. A Waste Management Contractor will remove these drums regularly to the WTY.	Hazardous waste will be disposed of at a permitted hazardous disposal site in Walvis Bay by the Waste Management Contractor.
			Hydrocarbons (oils, grease)	Used oil and grease 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. The appointed bulk fuel provider will	Used oil will be sent to a reputable recycling company for recycling.

No	Issue	Management commitment			
				manage most used oils and lubricants. The Waste Management Contractor will transfer other hydrocarbon wastes to the WTY to the temporary hazardous waste materials area.	
			Empty sulphur bags	Storage of empty sulphur bags on a surface that will prevent the spreading of sulphur to the environment.	Empty sulphur bags (not incinerated) should be encapsulated in the WRD to prevent the potential for the generation of acid mine drainage. The dumping area should be bounded and underlain by compacted calcrete. Once filled to capacity the disposal area should be covered with calcrete or calc-silicate rock.
			Sewage	Sewage will be treated at the modular sewage treatment plant (STP)	Treated sewage effluent will be reused in the process water circuit or for dust suppression (once tested and cleared for use). Sewage sludge will be dried and disposed of within the WRD or at the bio-remediation facility or disposed of off-site at a licenced sewage treatment facility. ~~Treated sewage effluent will be reused in the process water circuit. Sewage sludge will be dried and disposed of within the WRD or sued at the bio-remediation facility.~~
			Domestic Waste – sewerage slurry/sludge and screens	Waste receptacles will be placed that can contain the volume of waste (either a dedicated skip or wheelie bin). If screens or slurry are radioactive, this waste will be dried for the latter, and transferred to the WRD for final disposal. An alternative option is to transfer the slurry to the Husab Mine bioremediation site for treatment, before final disposal.	If screens and slurry are not classified as radioactive contaminated, they will be transferred off-site to the respective registered waste management sites in Walvis Bay and/or Swakopmund. The screens will be disposed of off-site at the Walvis Bay hazardous landfill site and the slurry at the Walvis Bay or Swakopmund Municipality Sewerage works site.
		Hazardous radioactive contaminated solid waste (non-	Solid Waste (i.e. ash, filters, etc.) from the incineration activities	Hazardous/radioactive waste will be stored in sealed drums in work areas. A Waste Management Contractor will remove these drums regularly to the TSF / WRD.	Any solid waste from the proposed incinerator may under no circumstances be disposed of in any municipal or similar waste disposal or landfill site, unless such a site is licensed to accept radioactive waste.

No	Issue	Management commitment			
		mineralised)			Radioactive solid waste from the incinerator (i.e. ash and filters) must be disposed of on site in accordance with the requirements laid down by the NRPA.
					If Swakop Uranium decides to dispose of the radioactive contaminated ash on the TSF, the following requirements must be implemented: • The ash must be comprehensively mixed and then disposed of with the tailings onto the TSF. The ash/tailings on the TSF must be kept moist until it is eventually capped, to minimise wind-blown dust from this facility.
					If Swakop Uranium decides to dispose of the radioactively contaminated ash within the WRD, with the other radioactive solid waste (i.e. filters) from the incineration activities, the following requirements must be implemented: • The solid waste (i.e. filters and possibly ash) must be disposed of in sealed drums which will be encapsulated in the WRD to prevent contact with infiltrating rain water and to reduce the potential for acid mine/rock drainage. The dumping area must be properly designed to ensure it is properly bound and underlain by compacted calcrete. Once filled to capacity the disposal area shall be covered with compacted calcrete or calc-silicate rock.
		Medical waste	Syringes, material with blood stains, bandages, etc.	Medical waste will be stored in sealed drums at the clinic. A Waste Management Contractor will remove these drums regularly to the WTY.	Medical waste will be transported by the Waste Management Contractor to a permitted/approved incineration facility in Walvis Bay and/or Swakopmund for incineration.

No	Issue	Management commitment
5	Waste transport	Waste will be transported on site as well as to the appropriate disposal facilities by an approved waste contractor. Vehicles transporting hazardous waste will be clearly marked. The integrity of transport packaging and containers will be appropriate to the type of waste being transported. Loading and unloading procedures will be followed to avoid spillage.
6	Waste disposal	No waste shall be burnt (with the exception of explosives packaging). Empty Ammonia Nitrate bags (i.e. explosives packaging) will be returned to the supplier, where possible. ~~Non-hazardous non-contaminated general waste will be disposed at a specified facility in the footprint of the waste rock dump. All other~~ Non-hazardous non-contaminated general waste will be disposed of to a licensed landfill site in Swakopmund, if not incinerated on site. Hazardous waste (non-radioactive) will be disposed of to the licensed hazardous landfill in Walvis Bay. Radioactive waste will be disposed at recorded sites within the WRD or in the TSF, as required.
7	Waste incineration: Waste inventory	Swakop Uranium's existing waste inventory must be updated to include the solid waste streams arising on commencement of operations of the proposed incinerator. The inventory must fulfil relevant regulatory requirements, including those laid down by the entities responsible for water management in the country, as well as the NRPA's requirements for the disposal of radioactive waste.
8	Waste incineration: Waste classification	Analyse the ash (and filters) after various incinerations (for various waste types) to confirm the ash characteristics (i.e. hazard classification and degree of radioactivity.

Table 7-25B: Waste to be incinerated

Waste Source	Waste Types	Estimated volumes to be incinerated	Comments	Radioactively contaminated (RC)
All Sites (General Waste)	General waste	Estimated 63 x 15 metric tons of general waste produced per year that can be incinerated	General Waste / PPE - The common material of the PPE is cotton/ poly cotton 20%	No
Acid Plant & TSF (Potentially radioactive contaminated)	Dust masks + cartridges	400L 200kg a year	Radioactive contaminated waste 20% including radioactive PPE (10% of the 20%)	Assume 20% is RC → 150 kg/a
	Overalls	44x2 (88) ; 24x2 (44) = 132 pairs 264 kg		
	Acid suites	80 pairs 40 kg		
	Safety boots	68 pairs 68 kg		
	Gum boots	44 pairs 44kg		

Waste Source	Waste Types	Estimated volumes to be incinerated	Comments	Radioactively contaminated (RC)
Final Product Recovery (Radioactive contaminated)	Contaminated waste (not sand or pipes, mostly PPE etc.).	20kg per week = 1040 kg		Assume all is RC → 1 050 kg/a
Processing (Comminution)	Radioactive contaminated PPE	Overalls: 248 per year = 496 kg/year Safety Boots: 124 per year = 124 kg/year Tyvec Suits: 1488 per year = 744 kg/year		Assume 10% of overalls and 100% of safety boots and Tyvec suits are RC → 918 kg/a
CCD/Leach/Ponds (Radioactive contaminated)	Contaminated PPE including disposable overalls used for pyrolusite make-up	140kg per week = 7280 kg		Assume 50% is RC → 3 650 kg/a
Reagents Area (Hazardous waste)	HCI	1 m^3 Flobin @ 2 Flobins per month	Reagents containers waste and sulphur bags 50%	No
		Total = 24 per year		
	Ammonia solution (NH4OH)	1 m^3 Flobin @ 1 Flobins per month		
		Total = 12 per year		
	Sodium Hypochlorite (Germicide)	1 m^3 Flobin @ 1 Flobins per month		
		Total = 12 per year		
	Allamine	1 m^3 Flobin		
		25 per year		
	Modifier (superfloc viscosity modifier)	1 m^3 Flobin		
		13 per year		
	Empty sulphur bags	52 587 empty Sulfur bags, additional ± 35 000		
		Approximate total = 87587 bags		
	1000L containers	1000 lt containers containing grease and oil (1 m x 1.2 m)		
		150 containers per year		
Hydrocarbon Waste	Hydrocarbon contaminated material		Hydrocarbon waste 10%	Assume 10% is RC → 18 000 kg/a

7.10.4.2 Mineralised Stockpiles

Objective: Ensure proper management of stockpiled low and high grade ore and waste.

Table 7-26: Mineralised Stockpile Management Plan

No	Issue	Management commitment
These commitments apply to <u>all phases</u>		
1	Erosion of stockpile	Monitor erosion on low grade stockpile and rehabilitate eroded areas when necessary.
2	Monitor development of stockpiles	Report biannually on the tonnes of waste generated and the footprint of the stockpile.
These commitments apply to <u>decommissioning</u> only		
3	Final processing of stockpile	Process the low grade stockpile at the end of life of mine, or when required. No low grade ore stockpiles will remain after closure.

7.10.4.3 Tailings and Waste Rock Material

Objective: Ensure proper handling and disposal of tailings in the TSF and of waste rock onto the WRD that minimises surface, groundwater and air pollution.

Various other Management Plans also provide management commitments relating to the Tailings material and associated TSF as well as the WRD.

Table 7-27: Mineralised waste facilities (TSF and WRD)

No	Issue	Management commitment	
These commitments apply to the <u>design phase</u> only			
1	TSF design	The TSF will be constructed in accordance with the environmental protection design measures described below.	
		TSF Aspect	**Description**
		Volume of tailings	Approximately 186 million m^3 over the mine life.
		Physical dimensions	The proposed TSF has a footprint of ~420 ha with maximum north-south and east-west dimensions ~ 2 100 and ~2 200 m, respectively. The final crest elevation (top of the structure) is approximately 530 mamsl, giving a maximum overall dam height of 63 m in the south and 45 m in the north.
		Access and access control	The TSF will be fenced by an NNNP type standard fence or relatively similar. Only authorised personnel will be entitled to work within the TSF area. Other personnel, including visitors, will be escorted on site once they have been through the requisite site induction process.

No	Issue	Management commitment	
		Method of delivery and deposition of tailings	Tailings will be transported to the TSF via two pipelines only one of which will be operation at a time. The pipelines will run within a trenched / bunded corridor lined with a geomembrane to prevent the ingress of tailings liquor into the ground in the case of a pipeline leakage / spillage. Lined collector sumps will be present at low spots along the pipeline route for subsequent pumping of any spills to the TSF. The tailings lines will terminate at a tank distribution centre at the TSF. From here, tailings will be directed to two ring main systems located around the crest of the TSF that will be raised concurrently with the dam crest as the dam increases in height. Tailings will be deposited so that a uniform beach is maintained around the perimeter of the TSF. The dam will be raised at a slope of 1V:4H. Inert material will be used to build the lifts and cover the slopes. Tailings will be discharged inside of the lifts.
		Lining	The tailings facility will be lined using a composite liner comprising 1mm HDPE underlain by a 250mm layer of selected fine-grained compacted fill.
		Drainage, seepage and return water	The supernatant pond on the tailings dam will be drained via a floating barge / pumping system. Water pumped from the pond is directed to the return water dam located at the northern end of the facility. A top-of-liner seepage collection system will be constructed and the granular drains will collect seepage from the overlying tailings and will direct it to the outside perimeter of the dam. The seepage will then flow in within HDPE pipework and will discharge into the lined seepage collector sump located in the south-western corner of the TSF. Water from this sump will be pumped into the return water dam. The return water dam will have two HDPE- lined compartments so that maintenance of the membrane can be undertaken.
		Other utilities/ services	A service road and a 33 kV power line will be constructed parallel to the pipeline between the process plant and the TSF. New satellite offices will also be constructed next to the TSF. The original temporary access route will be relocated onto the ring road around the TSF. This road will only be for use in emergencies once the permanent access road is completed.
		Dust erosion control	As the TSF rises the sides of the TSF will be covered in a layer of rock to control dust and attenuate storm water infiltration and runoff. At decommissioning the surface will be capped with the same environmental protection objectives.

No	Issue	Management commitment	
		Stormwater management (clean and dirty controls)	A dirty water collection system will collect all runoff water from the side slopes of the TSF that will collect in the pollution control dam located at the low spot of the TSF. This water will be used for dust control (if treated) or in the processing plant. Alternatively, it will be evaporated. An additional diversion for clean water run-off around the eastern and western perimeters of the TSF will be provided provided.
2	WRD design	The WRD will be constructed in accordance with the environmental protection design measures described below.	
		WRD Aspect	**Description**
		Physical dimensions	A footprint of approximately 1 235 ~~659~~ ha. A height of up to 150 ~~210~~ m. Maximum overall side slope inclination of approximately 31 degrees.
		Method of delivery and deposition, method of on-going development	The waste rock from the pit will be hauled to the WRD and placed in 30m high lifts. Benches will be formed around the outside of the final dump at 30m vertical intervals.
		Lining	A minimum of 2m thick layer of overburden of high neutralising capacity will be placed beneath the WRD to attenuate any seepage.
		~~Drainage system including return water system~~	~~The 2m attenuation layer will generally be placed over existing ground contours. Granular drains (French drains) will be placed on top of the attenuation layer in the natural low spots that tend to drain the footprint area towards the south. Seepage from the waste rock above will tend to migrate towards the low granular drains/channels and be directed to a low spot at the southern end of the WRD and from there into an external drainage channel that will transport any seepage towards the Zone 2 open pit.~~ ~~A leakage interceptor trench excavated to refusal will be constructed around the downstream perimeter of the WRD. The trench will be equipped with a downstream face geomembrane and a seepage collection pipe that will drain to a lined sump.~~
		~~Storm water controls~~	~~A clean water diversion will direct all runoff and near surface water from catchments up-contour of the mine site around the eastern side of the waste rock dump. This water is directed to the downstream Welwitschia field.~~ ~~A dirty water collection system will collect all runoff water from the WRD and store this water in a pond for subsequent use for dust control or in the processing plant. Alternatively, it will be evaporated.~~
		Drainage system and Stormwater controls	Refer to Biodiversity Management Plan (Section 7.4 and Surface and Stormwater Management Plan (Section 7.5).

No	Issue	Management commitment	
		Other facilities Crushing plant for TSF rip-rap cover and material for blasting holes.	A crushing plant (Aggregate Crusher) will be operated from within the footprint of the mining area ~~waste rock dump~~ to provide rip-rap (rock of a specific size and mineralogy) for the continual covering of the stand-alone TSF sides as it rises.
These commitments apply to <u>decommissioning and closure</u> only			
3	Closure of the TSF	At closure it will be necessary to ensure that contamination beyond the TSF by wind, surface runoff or groundwater movement is prevented via the implementation of appropriate control measures. The following control measures are incorporated in the closure proposals: • Placement of a final cover over the entire top surface of the TSF in order to prevent dust emissions and to minimize infiltration of rainfall. Runoff from the final cover will either be captured in the run off dam or be allowed to flow into the environment along natural gradients if proven to be of suitable quality. • The cover will consist of i) suitable soils to encourage near-surface storage and subsequent evaporative release of infiltration and ii) a low permeability element beneath the store-release zone to inhibit any infiltration that does pass through the store-release zone. At closure, seepage will still be collected by the seepage collection system and will report to the low spot at the toe of the dam via the engineered drainage channels. This seepage (and collected run off) will then be actively pumped back to the Zone 2 pit until such time as a passive system is developed.	

No	Issue	Management commitment
4	Closure of WRD	At closure it will be necessary to ensure that contamination beyond the WRD by wind, surface runoff or groundwater movement is prevented via the implementation of appropriate control measures. The following control measures are incorporated in the closure proposals for the WRD: • Run-off contamination will be limited to suspended solids that will be contained in the pollution control dam. At closure, the solids will be contained by solids capture paddocks constructed for that purpose. • Erosion capture paddocks will be constructed on the northern, eastern and southern sides of the WRD to provide long term management of erosion solids. These will be designed according to the observations made during operations with respect to erosion / solids deposition rates. Run-off water from the paddocks will be directed to the Zone 2 pit. • Toe paddocks around the WRD should be constructed with calc-silicate material to collect runoff water and subsequently allowed to evaporate, while possible pollutants will be kept back in the paddocks. Toe paddocks should be constructed that contact water can be effectively retained and subsequently evaporated. The paddocks should be designed that care and maintenance after mine closure is limited or not required. However, once the toe paddocks have been constructed, these should be monitored during the operations phase and possibly the first few years after closure. During this stage, any 'maintenance' or improvements should be made (as and where required). This will be implemented via continual improvement initiatives if risks are identified. • ~~At closure the pollution control dam will be decommissioned and seepage will all be directed to the Zone 2 pit.~~

7.11 Noise Management

7.11.1 Introduction

There is a range of construction, operation and decommissioning activities that have the potential to generate noise. Noise pollution will have different impacts on different receptors because some are very sensitive to noise and others are not. For example, mine workers in general do not expect an environment free of mine related noise and so they will not be sensitive to environmental noise pollution at work. In contrast, visitors to the Namib Naukluft National Park are likely to be sensitive to unnatural noises and so any change to ambient noise levels because of mine related noise will have a negative impact on them and their wilderness experience.

The nearest inhabited location relative to the proposed development is Arandis ~~village~~. It is situated not far from the B2 main road and at a distance of about 18 km from the Husab Uranium Project development, with an existing mining operation in-between. As such it is estimated to be completely outside audible reach of noise originating from the proposed development.

7.11.2 SEMP Requirements

No noise related objectives and targets have been set in the SEMP.

7.11.3 EIA Commitments

The following commitments are derived from the various Husab mine and associated linear infrastructure EIA reports with regards to noise:

- Document and investigate all registered complaints and make efforts made to address the area of concern where possible.
- Blasting will be conducted in the afternoons where possible because the noise impacts are reduced at this time of the day relative to the mornings.
- Early in the operation phase an environmental ambient noise survey will be conducted by a qualified noise assessment professional at identified potential sensitive receptor sites to verify the model predictions. Subsequent actions, if any, will be determined by the appointed qualified noise impact assessment professional.

7.11.4 Relevant Activities

Construction	Operational	Decommissioning	Closure
Generators Vehicle movement Earth moving equipment General building activities Initial drilling and blasting	Drilling Blasting Earth moving equipment material tipping Vehicle movement Crushing Processing plant conveyors Generators Incinerator	Vehicle movement Earth moving equipment Material tipping Stripping of buildings and equipment Generators Blasting (Possibly)	N/A

7.11.5 Management Plan

Objective: Limit excessive noise pollution.

Table 7-28: Noise Management Plan

No	Issue	Management commitment
These commitments apply to <u>construction, operation and decommissioning</u>		
1	Impact of remote noise on the environment	Document and investigate all registered complaints and make efforts to address the concern.
2	Minimise remote noise	As a general rule, the activities (i.e. blasting) most likely to cause noise pollution impacts should be restricted to daytime activities. Blasting should be conducted in the afternoons as far as practically possible.
3	Ambient noise survey	Early in the operation phase, an environmental ambient noise survey will be conducted by a qualified noise assessment professional at identified potential sensitive receptor sites to verify the model predictions. Subsequent actions, if any, will be determined, in conjunction with Swakop Uranium, with the appointed qualified noise impact assessment professional.

No	Issue	Management commitment
4	Maintenance of vehicles and equipment	Vehicles and equipment will be regularly serviced and maintained in good working order.

7.12 Socio-economic Aspect Management

7.12.1 Introduction

The activities associated with the proposed mine will result in socio-economic impacts in all mine phases – some positive and some negative. These impacts related to, amongst others, employment/job creation, inward migration, the stimulation of local, regional and national economies, use of public infrastructure such as roads, public consultation, social well being and tourism.

7.12.2 SEMP Requirements

The SEMP sets a sustainable socio-economic objective that the Uranium Rush should improve Namibia and the Erongo Region's sustainable socio-economic development without undermining the growth of other potential sectors. An additional objective is to promote local employment and integration of society. The relevant targets and indicators are tabled below.

Table 7-29: SEMP Socio-economic Development Targets and Indicators

Target	Indicators
The contribution of mining to the economy should increase over time.	• Payment of royalties and corporate taxes. • Use local inputs where possible. • Uranium mines should not be granted export processing zone (EPZ) status. However it should be noted that some uranium mines may have already received EPZ status.
Uranium companies must hire locally where possible	• All companies must comply with their employment equity target (certificate).
Most employees should be housed in proclaimed towns	• Mines do not create mine-only townships or suburbs • There will be no on-site hostels.
With regard to skills development, develop more qualified artisans, technicians, geologists, accountants and engineers	• Increase in the number of graduates. • Every mine has/funds a skills development programme for employees. • Every mine has 10 % more bursary holders than work-permit holders.

7.12.3 EIA Commitments

The following commitments are derived from the various EIA Reports (Metago, 2010; Metago, 2011 & SLR 2013) with regards to socio-economic issues:

- Employ local people where possible.
- Procure local services where possible.
- Implement a formal skills development programme.
- Incorporate economic considerations into mine closure planning from the outset.
- Closure planning considerations will address the skilling of employees for the downscaling, early closure and long term closure scenarios.
- Closure planning considerations will address the needs of tourism for the downscaling, early closure and long term closure scenarios.
- Swakop Uranium will continue to meaningfully engage with relevant people and entities in the tourism, conservation and recreation sector to ensure that potential negative impacts from mining are managed in a way that the related impacts on tourism are acceptable. The findings and recommendations of the SEA (SAIEA, 2010) apply. In this regard, the mine will consider ways to contribute to the following:
  - Support regional conservation efforts.
  - Support public awareness campaigns about the desert and the Namib Naukluft National Park and Dorob National Park (DNP) formerly the West Coast Recreation Area.
  - Establish new roads to and/or establish alternative tourist attractions.
  - Assist relevant authorities with the maintenance of key infrastructure such as gravel roads in the Namib Naukluft National Park.
- Consider ways to empower, support and use local/regional people for employment and local business for procurement.
- The mine will collaborate with local and regional government and other entities in the commercial sector to identify and implement interventions that may assist with the prevention of inward migration and/or the prevention of the associated negative impacts. The findings and recommendations of the SEA (SAIEA, 2010) apply. In this regard the mine will:
  - Focus social investment on community infrastructure, education, housing, sanitation services and/or health.
  - Focus this investment in the proclaimed towns that already exist in the region (mainly Arandis, Swakopmund and Walvis Bay).
  - Ensure that its workers have access to formal serviced houses.
  - Collaborate with local authorities to prevent the increase in crime and informal settlement development.
- Implement a stakeholder communication and engagement strategy. The key components of which are: maintaining an inclusive comprehensive stakeholder database that recognises both internal and external stakeholders, encouraging meaningful and transparent communication and information sharing, ongoing monitoring to ensure that the strategy is up to date, and follow up auditing.
- Develop a formal complaints (grievance) procedure that incorporates measures for receiving, responding, tracking and recording complaints and grievances from both internal and external stakeholders.
- Maintain an employee profile that can assist with both managing impacts and informing the mine's closure plan – for both long term planned closure and for unplanned premature downscaling or closure.

- Develop worker radiation, HIV/AIDS and tuberculosis programmes that can be extended to contractors and service providers, and into the communities where Husab workers reside.
- Ensure formal home ownership and discourage informal housing for employees and contractors.
- Extend employee education programmes on social and health issues into interest communities.
- Commitments with respect to the traffic can be found in Section 7.12.5.3 and tourism issues can be found in Tables 7-39 to 7-45.

7.12.4 Relevant Activities

Construction	Operational	Decommissioning	Closure
Construction and initial operational activities Recruitment of contractors and workers Procurement of local materials and services	Operational activities Recruitment of contractors and workers Procurement of local materials and services	Decommissioning activities Recruitment of contractors and workers Procurement of local materials and services	Aftercare and maintenance activities Procurement of local materials and services

7.12.5 Management Plan

This plan is made up of the following components:

- Employment creation.
- Economic development.
- Infrastructure – road use.
- Inward migration.
- Social Wellbeing and Community development.
- Contractor's camp.

Stakeholder consultation is dealt with in section 7.1.

7.12.5.1 Employment Creation

Objective: Enhance the positive impacts associated with job creation.

Table 7-30: Employment Management Plan

No	Issue	Management commitment
These commitments apply to construction phase only		
1	Employment opportunities	Contractors will be required to provide skills training and development of the contractor workforce. Contractors must be required to employ local people where appropriate.
These commitments apply to operation and decommissioning		
	Employment opportunities and development benefits.	Employ local people and make use of local goods and services where possible and appropriate.
2		Implement formal training policy and programmes that aim to improve skills. Programmes should be available for all directly and indirectly employed personnel.

7.12.5.2 Economic Development

Objective: Enhance the positive and limit the negative economic impacts.

Table 7-31: Economic Development Management Plan

No	Issue	Management commitment
These commitments apply to <u>construction, operation and decommissioning</u> phases		
1	Positive benefit on local and regional economies	Swakop Uranium will continue to engage with the tourism industry and conservation to ensure that potential negative impacts from mining are managed in a way that the related impacts on tourism are acceptable.
2		Specific tourism offsets will be established by Swakop Uranium in conjunction with MET (DWNP). These offsets will provide the tourism and recreation sectors with equivalent or better facilities and experiences currently associated with the Welwitschia Campsite, and temporary disturbance of the Swakop River campsites.
3		Swakop Uranium has volunteered to assist MET (DWNP) to upgrade the big Welwitschia tourist facilities. Swakop Uranium will continue to assist with the maintenance of the gravel Welwitschia drive road during construction & operational activities, as long as this road is utilised for Husab mine related activities (e.g. exploration, monitoring activities, etc.).
4		If Swakop Uranium finds, through their Grievance procedure, that tourists and recreation seekers are affected by the Khan River linear infrastructure, Swakop Uranium will work together with MET (DWNP) to actively conserve a section of the Khan River (downstream) of the new road and bridge, so that tourists and recreation seekers that will be affected by the Khan River linear infrastructure will have alternative options for accessing areas with similar wilderness experiences in the Khan River.
5		Implement a policy favouring local procurement where feasible. Develop mechanisms for identifying local business supplier opportunities.
6		Investigate opportunities to facilitate the participation of women in the providing good and services to the mine and local communities.
7		Procurement strategies should investigate ways to promote development of local SMME's to reduce long term dependence on the mine.
These commitments apply to <u>operation, decommissioning and closure (planning) phases</u>		
8	limit potential negative impacts on closure	Incorporate economic considerations into closure planning, for example re-skilling of employees. Timeously engage with local structures and business to discuss strategies for limiting economic impact of mine closure.

7.12.5.3 Infrastructure – Road Use

Objective: reduce the potential for vehicle related impacts on road users.

Table 7-32: Road Use Management Plan

No	Issue	Management commitment
These commitments apply to <u>construction, operation and decommissioning</u> phases		
1	Current and future road use related impacts	Improve basic road safety behaviour for all employees through training and awareness programs.
2		All persons working on the Husab site are expected to conform to the site and NNNP traffic rules:

No	Issue	Management commitment
		• Adhere to speed limits. • Ensure drivers have valid driver's licenses. • All vehicles should be roadworthy. • Zero tolerance for drinking and driving. • Drive with lights on when on site. • All Husab ~~Project~~ mine related personnel are to treat tourists with respect.
3		Liaise with the land owner with respect to maintenance of roads in NNNP utilised by Swakop Uranium.
4	Traffic related accidents	See also Tables 7-39 to 7-45 Intersections on the B2 and C28 to be upgraded. Speed limits on access roads to be established and enforced.
5	Emergency	Any mine related road accident must be handled in accordance with the emergency response procedure.

7.12.5.4 Inward Migration

Objective: Limit the impacts associated with inward migration.

Table 7-33: Inward Migration Management Plan

No	Issue	Management commitment
These commitments apply to operation and decommissioning phases		
1	Perceived job opportunities causing inward migration	Engage with local and regional government and other entities to identify and implement interventions to reduce inward migration and/or the associated negative impacts. Focus social investment on community infrastructure, education, housing, sanitation services and/or health. Focus investment in the proclaimed towns that already exist in the region (mainly Arandis, Swakopmund and Walvis Bay). Encourage home ownership (Ensure that its workers have access to formal serviced houses). Collaborate with local authorities to prevent the increase in crime and informal settlement development.
2	Transparency in employment procedures and managing expectations	Establish a transparent employment procedure. Broadly disseminate information on the actual number of skilled and unskilled positions available during all project phases in an effort to manage expectations. This issue will also be addressed during the regular stakeholder engagement liaison.

7.12.5.5 Social link between the mine and the community

Objective: To reduce impacts associated with the link between the mine and communities.

Table 7-34: Social Link and Community Development Management Plan

No	Issue	Management commitment
These commitments apply to operations, decommissioning and closure phases		

No	Issue	Management commitment
1	Issues relating to social well being	Implement a stakeholder communication and engagement strategy to maintain an inclusive stakeholder database of internal and external stakeholders, encouraging meaningful and transparent communication and information sharing, monitoring of communication strategy and auditing of the process.
2		Develop a formal complaints (grievance) procedure that incorporates measures for receiving, responding, tracking and recording complaints and grievances from both internal and external stakeholders.
3		Maintain an employee profile that can assist with both managing social wellbeing impacts and informing the mine closure plan – for both long term planned closure and for unplanned premature downscaling or closure.
4		Implement a formal programme which addresses employee well-being in the workplace.
5		Develop worker radiation, HIV/AIDS and tuberculosis programmes that could be extended to contractors and service providers, and into the communities where Husab workers reside.
6		Ensure formal home ownership and discourage informal housing for employees and contractors.
7		Extend, where necessary, employee education programmes on social and health issues into interest communities to address maternal health, wellness, lifestyle, alcohol abuse and gender discrimination as part of their programme, so as to combat the socio-economic and cultural aspects that favour the spread of HIV/AIDS and tuberculosis (TB).

7.12.5.6 Main Site Contractor Camp

Objective: ensure there is effective management regarding the contractor camp and its occupants.

Table 7-35: Main Site Contractor Camp Management Plan

No	Issue	Management commitment
These commitments apply to <u>construction only</u>		
1	Duration	The camp will be a temporary facility that is required for approximately 36 months.
2	Capacity	The camp will be designed to house up to 4 000 occupants during peak construction periods.
3	Occupants	Only construction workers and camp facility service personnel will be permitted to stay in the camp.
4	Visitors	No visitors will be allowed.
5	Rooms	The rooms will be a combination of prefabricated rooms, and/or containers. Rooms will house up to 4 people at a time.
6	Recreation amenities	The camp will be equipped with recreation amenities. These typically include: DSTV, pool tables, table tennis, gym, basketball court, canteen, and pub.
7	Ablution facilities	Prefab toilets and showers (linked to a septic tank) will be provided until the permanent modular sewerage plant is constructed.
8	Transport	The construction work cycle will be six days on duty and one day off duty. Therefore, camp occupants will be transported to and from site by bus from Walvis Bay, Swakopmund and/or Arandis on a weekly basis.

No	Issue	Management commitment
9	Potable water	Potable water for drinking, cooking and ablutions will be provided via the temporary pipeline from the Rössing reservoir (this is the subject of the linear infrastructure EIA report).
10	Power supply	Power will be sourced from NamPower (the off site power line is part of the linear infrastructure EIA report). The on site Husab Substation (which will be part of the operational phase facilities) will transform to power 3311kV and 132~~400~~kV. Back-up power at the contractor's camp will be supplied by 12MVA portable generators.
11	Sewage	Sewage from the toilets for the temporary construction camps will be taken off site and disposed of at a municipal works. Thereafter, sewage will be treated at Husab's permanent modular sewage plant.
12	General waste	General waste will be managed as per the Husab Project waste management procedure.
13	Health, safety and environment	All camp occupants will receive induction on arrival and at appropriate intervals when returning from extended leave periods. There will be ongoing awareness campaigns.
14	Security	The camp will be fenced and will have one access gate with 24 hour security. Camp occupants will comply with the NNNP rules concerning permits and movement outside of the designated project boundary.

7.13 Radiation Exposure Management

7.13.1 Introduction

Four pathways of radiological impacts on human health have been identified:

- Direct external exposure to radiation.
- Aquatic pathway through radio-nuclides that are carried in surface and groundwater
- Atmospheric pathway through radon gas and radio-nuclides in dispersed dust.
- Secondary pathways that include: radiation from contaminated soils, ingestion of the contaminated soils, the eating of crops that are grown on radioactive contaminated land/soil, and/or eating radioactive contaminated fish and/or animals (livestock).

7.13.2 SEMP Requirements

The SEMP sets the objective that workers and the public must not suffer increased health risks from the Uranium Rush. The relevant targets and indicators are tabled below.

Table 7-36: SEMP Public Health Management Targets and Indicators

Target	Indicators
Public exposure to ionizing radiation due to uranium mining should not increase by more than 1 mS/v above background levels per annum.	Public dose assessments to be conducted by each mine project. Measured change in absorbed radiation dose of uranium mine workers and medical professionals (designated radiation workers).
Dose limits for mine employees should not exceed 20 mS/v per annum averaged over 5 years with a limit of 50 mS/v in a single year.	Measured change in the incidence rate of industrial diseases amongst uranium mine workers.
No measurable increase in the incident rates of lung or other industrial related	Measured change in the incidence rate of diseases scientifically attributed to radiation amongst

Target	Indicators
cancers, industrial lung disease, industrial induced renal damage, HIV/AIDs, tuberculosis and industrial dermatitis	members of the public, uranium mine workers and medical personnel.

7.13.3 EIA Commitments

Even though a separate Radiation Management Plan is to be produced according to the requirements of the Atomic Energy and Radiation Protection Act 5 of 2005, the following commitments concerning radiation exposure derived from various Husab mine and associated linear infrastructure EIA reports:

- 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. This issue will be considered in further detail during the detailed closure planning because of the fact that the mineral waste facilities will remain, that these may contain some non-mineralised waste and that the open pits will not be backfilled.
- The occupants of the contractor camp will be contained within the camp after working hours. The camp will be sited at least 500 m away from the on-site radiation sources (mineralised and non-mineralised).
- All transported product will be packaged and handled so that third parties cannot be exposed to radiation. Strict product related security measures will be in place.
- External radiation from key sources (mineral waste facilities ~~mine residue facility~~, mineralised stockpiles, open pits, and radioactive non-mineralised waste) will be monitored
- The radiation management plan will focus on the management of the direct radiation sources, the related environmental monitoring requirements, and minimising doses to as low as reasonably achievable.
- Emergency situations: Any spillage of substances that can expose third parties to unacceptable radiation levels will be handled in accordance with the Husab emergency response procedure.

7.13.4 Relevant Activities

Construction for project	Operational - cumulative	Decommissioning - cumulative	Closure – cumulative
Ore Mineralised waste	Ore and product Mineralised waste Non-mineralised waste Incineration	Ore Mineralised waste Non mineralised waste	Mineralised and non-mineralised waste

7.13.5 Management Plan

This management plan is made up of the following components:

- Direct exposure to radiation from on-site sources.
- Indirect pathway exposure.

7.13.5.1 Direct Exposure to Radiation from on-site Sources

Objective: prevent radiation related health impacts.

Table 7-37: Direct Radiation Exposure Management Plan

No	Issue	Management commitment
These commitments apply to <u>all phases</u>		
1	Third party access	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. This issue will be considered in further detail during the detailed closure planning.
2	Driller camp and contractors camp	The occupants of the contractor camp will be contained within the camp after working hours. The camp will be sited at least 500 m away from the on-site radiation sources (mineralised and non-mineralised). The contractor camp will only be operational for the construction phase.
3	Onsite waste incineration	Swakop Uranium must update their Radiation Management Plan (RMP) in line with the requirements stipulated in the Radiation Specialist Study (Appendix 10 of the EIA Amendment (SLR, 2018)). The updated RMP must be approved by the NRPA prior to the commencement of operations involving the proposed incinerator.
		The incinerator must be operated with the pollution control system that will meet the emissions limits presented in the Air Quality Management Plan (Section 7.7).
		Radiation-related data from air quality monitoring (see Sections 7.7 and 9.3) must be communicated to the regulatory authorities and will determine whether activities at the proposed incinerator remain compliant with regulatory provisions and Swakop Uranium's license conditions.
		Any solid waste from the proposed incinerator may under no circumstances be disposed of in any municipal or similar waste disposal or landfill site, unless such a site is licensed to accept radioactive waste. Refer to the Waste Management Management Plan (Section 7.10) for the commitments relating to the solid waste management.
4	Transportation of product	All transported product will be packaged and handled in a manner that third parties cannot be exposed to related radiation. Strict product related security measures will be implemented.
5	Monitoring	External radiation from key sources (mineral waste facilities ~~mine residue facility~~, mineralised stockpiles, pits, and radioactive non-mineralised waste) will be monitored. This takes all potential direct and indirect pathways into account. Also, soil samples (at close proximity to the air quality monitoring locations) will be taken for analysing the radionuclide components in the soil, every two years.
6	Radiation Management Plan	A radiation management plan will be developed and implemented (to be updated with requirements stipulated in the Radiation Impact Assessment of the proposed Waste Incinerator).
7	Emergency	Any spillage of substances that can expose third parties to unacceptable radiation levels will be handled in accordance with the Husab Mine emergency response procedure.

7.13.5.2 Indirect Pathways

Refer to surface water/stormwater, groundwater and air management plans provided in sections 7.5, 7.6 and 7.7. In addition to the commitments in the above mentioned management plans, Husab will develop and implement a radiation management plan.

7.14 Archaeological Resources Management

7.14.1 Introduction

There are a number of activities/infrastructure components in all phases of the project that have the potential to damage archaeological resources. These must be managed in order to minimise destruction of heritage resources.

7.14.2 SEMP Objectives and Targets

Uranium mining and related infrastructure developments should have the least possible negative impact on archaeological heritage resources. The relevant targets and indicators are tabled below.

Table 7-38: SEMP Heritage Resources Management Targets and Indicators

Target	Indicators
Mining industry and associated service providers avoid impacts to archaeological resources, and where impacts are unavoidable, mitigation, restoration and /or offsetting are achieved.	All mining and related developments are subject to archaeological assessment. No unauthorised impact occurs. Mining companies adhere to local and international standards of archaeological assessment.
Sustained research.	Development of a general research framework to identify gaps in scientific knowledge.

7.14.3 EIA Commitments

The following commitments are derived from the EIA Reports (Metago, 2010; Metago 2011 & SLR 2013) concerning heritage resources:

Prior to construction, the mine will ensure that:

- The Welwitschia siding site will be surveyed in detail to produce documentary evidence of the site as it currently exists. The option exists to reconstruct the station for use as an information centre under the guidance of an archaeological specialist. The fact that the TSF will influence views from this feature does change the intrinsic value of the landscape setting and this may render attempts to reconstruct the siding as less valuable. Notwithstanding this, the siding itself still has value as a specific heritage resource ~~and as a possible information centre~~.
- Where possible, the old German railway line will be cordoned off from mine related infrastructure and left undisturbed.
- Where any archaeological sites will be disturbed and/or destroyed they will be subjected to routine survey. In addition, the rock shelters will be tested for excavation potential (if they will be disturbed). This information will be used to apply for the necessary permits that are required in terms of the National Heritage Act 2004.
- All workers (temporary and permanent) will be educated about the importance of preserving archaeological sites.

- During all phases prior to closure the mine will ensure that it limits mine infrastructure, activities and related disturbance.
- Emergency situations: If there are any chance finds of archaeological sites that have not been identified and described in the specialist report, the mine will follow its chance find procedure. This 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.

7.14.4 Relevant Activities

Construction	Operational	Decommissioning	Closure
Infrastructure establishment Soil stripping Cleaning and grubbing Preparation of the foundations Compacting bases Opening borrow pits and trenches Slope stabilization Building internal linear infrastructure Vehicle movement	Mining development Vehicle movement waste management (mineralised) stockpile development	Removal of infrastructure Vehicle movement Material movement Slope stabilization	Vehicle and people movement (i.e. long term monitoring)

7.14.5 Management Plan

Objective: prevent the unacceptable loss of archaeological sites and related historical information.

Table 7-39: Archaeological and Heritage Sites Management Plan

No	Issue	Management commitment
These commitments apply to construction only		
1	Impacts on Welwitschia siding	Prior to construction, the Welwitschia siding site was surveyed in detail to produce documentary evidence of the site as it currently exists. The area will continue to be designated a no-go area and access thereto will continue to be prevented.
2	Impacts on rock shelters	Prior to construction and during operations, the rock shelters that may be impacted will be tested for excavation potential.
3	Impacts on the old German Railway Line	Prior to construction, remaining remnants of the old German railway line on site that will not be affected, may be cordoned off where possible, to prevent further deterioration.
4	Impacts on sites along infrastructure routes	Prior to construction, any sites likely to be affected by the infrastructure are to be assessed, particularly the Husab spring sites and the old German rail line. Infrastructure design to take into consideration known archaeological sites in route planning. See also point 7 below and proposed measures in Tables 7-39 to 7-45.
These commitments apply to construction, operation and decommissioning phases		
5	Identification of archaeological sites	Educate specific workers (temporary and permanent) about tell tale signs of archaeological sites and the action to be taken if one is identified.
6	Disturbance of archaeological sites	Limit mine infrastructure, activities and related disturbance.
7		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.

No	Issue	Management commitment
These commitments apply to construction, operation and decommissioning phases		
8	Chance heritage finds	If relics are found on site, report these findings to the Environmental ~~Manager~~ Superintendent who will take the appropriate action.
9		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.

7.15 Linear Infrastructure Management Plans

7.15.1 Introduction

This section addresses all of the linear infrastructure and is structured differently to the preceding sections in that it is facility or activity based, e.g. power line rather than aspect e.g. biodiversity, based. This is in response to the external review recommendations of the initial version of this document.

7.15.2 SEMP Objectives

The SEMP objectives and targets have been detailed in the preceding sections as they relate to each aspect e.g. biodiversity, water etc. In this section the key recommendations that relate to the proposed linear infrastructure developments have been extracted and are as follows:

- The Welwitschia ~~flats~~ fields and the Khan and Swakop Rivers are red flag biodiversity areas. The related recommendation is that the red flag areas should be avoided and actively conserved and in particular no new power lines, pipelines and roads linked to the Uranium Rush should be routed through red flag areas. Where this is not possible then offsets must be considered to offset the loss occurring in the area. If an offset is not possible then the no-go option should be considered. In the process of evaluating linear infrastructure routes alternatives must be considered.
- Linear infrastructure footprints (including roads, railways, power lines and pipelines) should be minimised by: following existing routes, by:
- Keeping infrastructure in corridors
- Mines sharing infrastructure
- Planning for future capacities and upgrading the capacity of existing infrastructure rather than creating new infrastructure in parallel
- Using the shortest feasible routes.
- Tour operators must be able to continue to utilise the Welwitschia ~~flats~~ fields, the associated big tourist Welwitschia, and the Khan and Swakop Rivers as a significant component of their tourist package offering.
- The public must be able to continue to use the Khan and Swakop Rivers as public recreational use areas.
- The main Husab Mine access road should be from the B2 in the north and not via the gravel road in the south. The associated recommendation is that once the access road from the B2 has been constructed then the gravel road to the south should be used exclusively for tourist purposes.

- Accidents on public roads and at key intersections should decline from current trends. Related to this is a recommendation that the B2 between Swakopmund and Arandis is strengthened to prevent wear and tear, widened to a four lane road and provided with more regular maintenance interventions. In addition, all roads carrying more than 250 vehicles per day must be strengthened, tarred and provided with proper intersections to the mines. The mine intersections need to have clear road signs and road markings.
- As a possible solution to preventing future congestion on roads, a cost-benefit analysis (including environmental costs and benefits) is required to determine whether railway links to mines are desirable and feasible. The objective is to transport 80% of all bulk goods by rail instead of road.
- All heavy vehicles should avoid the B2 coastal road between Swakopmund and Walvis Bay and should rather make use of the D1984 from Swakopmund to Walvis Bay. This road should be tarred and designated as an industrial vehicle route.
- In order to control dust emissions access roads to mines should be tarred.
- Groundwater can be abstracted for exploration and mine construction phases so long as the abstraction is based on a comprehensive hydrogeological investigation, including modelling of the affected compartment and downstream users. The modelling must show that downstream human users will not be negatively impacted and that there will be no unusual loss of wetland and riparian vegetation.
- All mines must use desalinated water for the operational phase.
- In order to conserve water and control dust from roads, dust emissions from un-surfaced roads should be controlled by chemical binding agents rather than water.
- New power lines should be positioned to follow existing infrastructure routes, avoid tourist routes and view points and to avoid bird flight paths. Bird flapper and bird diverters are required wherever lines cross rivers.
- New substations should be located to have minimal impact on tourist views and biodiversity while maintaining minimum technical requirements.
- All mining and related developments are subject to archaeological assessment and no unauthorised archaeological impacts should occur.

7.15.3 Linear EIA Commitments

The table below summarises the Linear EIA commitments with respect to linear infrastructure.

Table 7-40: Linear Infrastructure EIA Commitments

Aspect/ Impact	Management Measure
Hazardous structures and excavations	During the construction, operation and decommissioning phases, barriers and warning signs will be used to keep people and animals away from the hazardous excavations and infrastructure. In this regard: • The substations will be equipped with fences and warning signs. • The reservoirs will be enclosed to prevent drowning. • The bridge(s) and elevated sections of the permanent road will be equipped with barrier railings and warning signs to prevent people and animals from falling or jumping off the sides. • The borrow pits, trenches and stockpiles will be cordoned off with danger barricades or warning measures, as is appropriate, until they are closed. • The pylons and poles may be equipped with warning signs and/or base barriers to deter people from climbing the structures.
	Measures to limit bird fatalities associated with the ~~temporary 66 kV and~~ temporary and/or permanent 33~~11~~ kV power supply infrastructure will be incorporated into the planning and construction phases in a proactive manner (~~in liaison with NamPower as the owner of the servitude and the powerline infrastructure~~) as follows: • ~~The 66 kV line will be routed through the Khan Mine valley to limit impacts on the old mine, to avoid the spring and eastern cliffs.~~ • ~~The Khan River crossing should be perpendicular to the river, as far as possible, to maximise visibility and minimise the crossing distance; it should also coincide with the crossing point of the permanent 132 kV 220 kV line, as far as possible.~~ • ~~Wooded areas will be avoided where possible, and in particular the many trees in the eastern section of the Khan River~~ • Single wooden monopoles topped with an A-frame structure for carrying the insulators will be used for the ~~66kV temporary line and the~~ 33~~11~~kV permanent line rather than H-frame structures; however, H-frame structures will be used for straining. • NamPower will be consulted for the latest mitigations and overall management of the risks. Deflectors will be used in strategic places to improve the visibility during day and night times of the 33 kV power line to birds. • ~~The use of stay wires should be minimised on both lines.~~ • ~~All stay wires on both lines should be marked with a combination of white and red or black spiral vibration dampers.~~ • ~~Spiral double loop flight diverters (alternating black and white) should be fitted to top conductors on the 66kV line where it routes in and through the Khan River valley, and on top conductors of both the 66kV and 11kV lines where they route across any other bird flight paths.~~ • ~~In addition to spiral double loop flight diverters, some form of illumination should be fitted to top conductors on the 66kV line for its entire length where it routes in and through the Khan River valley, and to top conductors of both the~~

Aspect/ Impact	Management Measure
	~~66kV and 11kV lines where they route across any other bird flight paths.~~ • ~~Top conductors on the entire length of both the 11kV line and the 66kV line in the Khan Mine Valley should also be fitted with spiral double loop flight diverters, to mitigate against korhaan collisions.~~ • ~~Where there is a need to place power line infrastructure on higher ground so that it protrudes above the valleys, the conductors should be fitted with some form of illumination as well as spiral double loop flight diverters across all potential bird flight paths.~~ • ~~Raptor protectors (or some suitable alternative) should be installed on all top insulators on the 66kV A-frame line in the vicinity of vulture roosting sites; this applies in particular to camel thorn trees in the Khan River and its tributaries.~~ • ~~Each earth wire on both lines, if used, should have an air space safety gap wide enough to avoid being permanently active, but close enough to allow lightning strikes to bridge it.~~
	Measures to limit bird fatalities associated with the permanent 132 kV ~~220 kV~~ power supply infrastructure will be incorporated into the planning and construction phases in a proactive manner (in liaison with NamPower as the owner of the servitude and the powerline infrastructure) as follows: • The Khan River crossing should be perpendicular to the river, as far as possible, to maximise visibility and minimise the crossing distance; it should also coincide with the crossing point of the temporary 132~~66~~ kV line, as far as possible. • The eastern section of the Khan River valley, which has many trees, should be avoided. • Some form of illumination on the earth-optic wires where the line crosses the Khan River valley and other tributary. • Ideally, earth-optic wires along the entire length of the 132 kV ~~220 kV~~ power line (or at least across all potential bird paths) from the permanent substation to the Husab Mine substation should be fitted with spiral double loop flight diverters. • Where there is a need to place power line infrastructure on higher ground so that it protrudes above the valleys, the earth/optic should be fitted with some form of illumination as well as spiral double loop flight diverters across all potential bird paths.
	Information will be provided at stakeholder information meetings to educate the public about the dangers associated with hazardous excavations and infrastructure.
	Monitoring will be performed along the power lines to identify and record any bird fatalities. The reports will record the fatality position, a photograph of the carcass, and a photograph of the surrounding habitat. The report will be copied to the NamPower/NNF strategic partnership for further investigation and action.
	If people or animals sustain injuries as a result of the linear infrastructure, the Husab Mine emergency response procedure will be followed.
Physical disturbance of soils	A soil management plan will be implemented for construction, operation and decommissioning phases. key components:- • Limit the disturbance of soils to what is absolutely necessary, both in terms of site clearing and in terms of on-going maintenance (servicing equipment) and use of vehicles.

Aspect/ Impact	Management Measure
	• Where soils have to be disturbed the soil will be stripped, stored, maintained and replaced in accordance with the specifications of the soil management plan (Topsoil Management ~~conservation~~ procedure).
	As part of closure planning, the rehabilitation plans will take into consideration the requirements for long term erosion prevention and confirmatory monitoring.
Soil pollution	In the construction, operation and decommissioning phases all hazardous chemicals and materials (new and used), dirty water, and non-mineralised wastes will be handled in a manner that they do not pollute soils. This will be implemented through the specific Contractor ~~SEMP~~ Mini EMP's and one or more procedure(s) covering the following: • Pollution prevention through basic infrastructure design and through education and training of workers (permanent and temporary). • Safe transportation of chemicals and materials that have the potential to pollute soils. • The required steps to enable fast reaction to contain and remediate pollution incidents. In this regard the remediation options include in situ treatment or disposal of contaminated soils as hazardous waste. The former is generally considered to be the preferred option because with successful in situ remediation the soil resource will be retained in the correct place. The in situ options include bioremediation at the point of pollution, or removal of soils for washing and/or bio remediation at a designated area after which the soils are replaced. • Specifications for post rehabilitation audit criteria to ascertain whether the remediation has been successful.
	Major spillage incidents will be handled in accordance with the Husab Mine emergency response procedure.
Physical destruction of biodiversity	The permanent water pipeline will be buried as a preference. Where this is not possible, over and underpasses will be provided at regular intervals. The intervals for these passes will be obtained from an ecology specialist and will be included in the final detailed engineering design for the pipeline.
	• The permanent road will either have a 4-6 m high bridge or a level crossing over the Khan River and both of these designs will be sufficient in concept to allow free movement of fauna, particularly after sunset and before sunrise when the road will not normally be used. • The planned culverts beneath the permanent road will allow water and nutrient flows to continue. • Energy dissipaters will be used to prevent water flows from channelling and eroding the river bed adjacent to the road and culverts. • In the case of the elevated road in the Khan River and tributaries, underpasses and overpasses will be provided at regular intervals. The design specifications of these passes and intervals will be reviewed by an ecology specialist.
	Because linear infrastructure is routed through the SEA red flag areas, specific care will be taken to avoid both vegetation species of concern and highly sensitive habitats: • In the case of the Welwitschia Plains specific care will be taken to prevent harm or destruction of *Welwitschia mirabilis* individuals. • In the case of the Swakop and Khan Rivers specific care will be taken to prevent harm or destruction of all vegetation

Aspect/ Impact	Management Measure
	species of concern and all indigenous riparian trees. Access to the eastern side valleys and associated springs of the Khan River and Swakop River must be limited. The ecologist/botanist will review the plans and designs (before construction commences) to mark out all vegetation and habitat sensitivities so that these can be avoided. • Where damage cannot be avoided the ecologist/botanist will advise on the possibilities for rescue and relocation and applications will be made for the necessary permits in terms of the Nature Conservation Ordinance 14 of 1975 and the Forest Act, 12 of 2001 for the destruction and/or removal of protected vegetation.
	In the construction, operation and decommissioning phases a biodiversity management plan will be developed and implemented. The key components are: • To generally limit linear infrastructure, activities and related disturbance. As part of this commitment the size of development areas, including tracks, will be kept to an absolute minimum. • Construction activities in the Khan River, Swakop River and tributaries will preferably start after sunrise and finish before sunset so that the disturbance at dusk and dawn for animal and bird movement is reduced. • To audit the performance of construction teams in the red flag areas on a routine basis. Where the construction teams have not complied with the relevant plans they will be held accountable for ameliorating the damage. • To initiate rehabilitation and restoration initiatives as soon as possible. This will include follow up audits and monitoring in the short and long term to determine the success of the rehabilitation and restoration activities in terms of a range of performance indicators. • Implementation of an alien/invasive/weed management programme to control the spread of these plants onto and from disturbed areas. • If irreplaceable biodiversity will be permanently lost and restoration is not possible, a biodiversity offset will be investigated. This is a deviation from the recommendations in the Uranium Rush SEA which requires an offset whenever infrastructure routes through red flag areas. The modified approach is considered justified on the basis that should all the mitigation measures be successfully implemented then the level of impact should be acceptable (reducing to medium significance in the range of medium to high).
	Provision will be made for post closure monitoring to assess the effectiveness of rehabilitation and restoration and to implement additional measures where required.
	As an on-going contribution to the knowledge and conservation of biodiversity in the NNNP, Swakop Uranium will periodically contribute towards resourcing biodiversity studies. A priority in this regard is a study to understand more about the movement and associated processes of large mammals (i.e. zebras and possibly the Common Ostrich).
General disturbance of biodiversity	In the construction, operation and decommissioning phases the following will be implemented: • Disturbance footprints will be minimised through appropriate planning. • Training will be provided to all workers about the impacts associated with biodiversity disturbances;

Aspect/ Impact	Management Measure
	• To prevent high insect mortality, the use of light is kept to a minimum, and where it is required, yellow lighting is used: vertebrates should be kept away from the lighted areas with appropriate fencing where feasible. • There is zero tolerance to the killing or collecting of any biodiversity (including the collection of wood). In this regard, the locations of species of concern will not be marked or advertised. • Sand collection from the Swakop and Khan Rivers for building purposes near linear infrastructure will ~~be minimised~~ not be tolerated. • Occupants of the temporary accommodation camps will be required to remain within the camp after working hours. • All camps will be supplied with sufficient cooking equipment so that the collection of fire wood is not required for this purpose. • Strict speed control measures are used for any vehicles driving within the NNNP and DNP boundaries. A special reduced speed limit (perhaps 60 km/hour) ~~will~~ should be considered to be implemented for the permanent access road in the Khan River and associated tributaries where animal and bird concentration is highest. No off road driving will be allowed. General speed limit on the mine access road is as follows: - 100 km/h outside the park boundaries (± 9 km from the B2 Main Road) - 80 km/h inside the park boundaries • Speed limits on other park access roads (apart from the main access road to the mine) is 60 km/h • Noisy equipment will be well maintained to control noise emission levels. • Reservoirs will be enclosed containers that will prevent access by birds and animals. • Dust control measures are implemented. • Pollution prevention measures are implemented. • Routine monitoring of the EMP commitments will be performed and an incident and action report compiled on a weekly basis during construction and decommissioning and on a monthly basis during operations.
	Major spillage incidents will be handled in accordance with the Husab Mine emergency response procedure.
	Certain instances of injury to animals may be considered emergency situations. These will be managed in accordance with the Husab Mine emergency response procedure.
Loss of water as an ecological driver	• In order to ensure that sub surface water levels do not drop by more than 10 cm per month, the abstraction limit is calculated at a maximum amount of 0.5 Mm^3/annum (Biwac 2011). If the maximum amount is to be abstracted, three boreholes will be used and these will be spaced at least 2 km apart to prevent cumulative abstraction impacts on sub surface water levels. • For each abstraction borehole, a downstream monitoring borehole will be installed to enable monthly monitoring of the sub surface water levels. Monitoring of riparian tree health will also be done on a monthly basis by using physiological parameters (such as xylem pressure). If monitoring shows that either the water levels have dropped by more than 10cm

Aspect/ Impact	Management Measure
	or that the trees are struggling to survive then abstraction rates will be adjusted down or stopped; or alternative measures will be identified and implemented to water the affected trees. • The monitoring data will be made available to assist with the understanding of the water dynamics of riparian trees and the limit thresholds of extraction rates and water depths. • The competition for sub surface water between the indigenous trees and the exotic invasive *Prosopis sp* may be reduced by the clearing of the exotic trees from the IDC. If implemented, this will require a specific management plan and supervision.
Water pollution	• In the construction, operation and decommissioning phases the mine will ensure that all hazardous chemicals (new and used), dirty water, non-mineralised wastes, and product are handled and transported in a manner that they do not contaminate surface water run-off or near surface water flow. • On-going water quality monitoring in the Swakop and Khan Rivers will be done to track pollution trends and related risks. If pollution related to Swakop Uranium is detected, remediation steps will be implemented. • Major spillage incidents will be handled in accordance with the Husab Mine emergency response procedure.
Air pollution	• In the construction, operational and decommissioning phases, mitigation measures will be implemented for the main dust emission sources. The recommended methods to achieve this are: • Dust suppression on the temporary gravel road through chemical binding agents combined with vehicle speed controls to achieve a control efficiency of 90%. • Dust controls at the crushing and screening operation (for road building) by water sprays to achieve 50% control efficiency. • Dust controls at excavation, scraping, and material handling points (loading and offloading) by water sprays to achieve 50% control efficiency. • In addition to the monitoring and auditing programme that is included in the Husab Mine EMP (Swakop Uranium, 2010), Swakop Uranium will implement a source-based dust fallout performance indicator of a maximum of 1 200 mg/m2/day in the immediate vicinity of the temporary gravel road, the road material crushing operation, and excavation, scraping and material tipping points. The monitoring programme will be reviewed periodically. • Quarterly ~~performance audits and~~ inspections will be done to verify that the monitoring is taking place according to specifications and that the Swakop Uranium is adhering to the specified dust fallout indicators. • If used, diesel generators will be operated and maintained according to supplier specifications and the IFC emission limits. • The tourism and recreation offsets will be implemented. These relate to the relocation of affected campsites in the NNNP, the maintenance of the gravel road between the C28 and the big Welwitschia tourist site, the upgrade of the big Welwitschia tourist site and, with DWNP approval, the protection of a section of the Khan River downstream of the linear infrastructure.

Aspect/ Impact	Management Measure
	• As part of closure planning the rehabilitation designs will incorporate measures to address long term pollution prevention and confirmatory monitoring.
Noise pollution	• All registered complaints will be documented, investigated and efforts made to address the area of concern. • The tourism and recreation offsets will be implemented. These relate to the relocation of affected campsites in the NNNP, the maintenance of the gravel road that routes between the C28 and the big Welwitschia tourist site, the upgrade of the big Welwitschia tourist site. • Construction activities and traffic will preferably be limited to the daylight hours between sunrise and sunset. This is particularly relevant in the NNNP and the Khan River and tributary valleys on the weekends when tourists and members of the public may be camping overnight.
Blast related damage to third party property and/or injury to third parties and animals	• The blast design, implementation and monitoring will, as a general rule, ensure that: o Fly rock is contained within 500 m of the blast site. o Ground vibration at the closest third party structures (granite quarries, Arandis airport and Rössing Uranium Mine) is less than 12 mm/s peak particle velocity. o Air blast at the closest third party structures (Rössing Uranium Mine) is less than 130 dB. o Prior to each blast the area within a 1 km radius of the blast site will be cleared of third parties. Prior to each blast an audible warning will be sounded. • All registered complaints will be documented, investigated and efforts made to address the area of concern. • If a person or animal is injured by fly rock this must be handled in accordance with the Husab emergency response procedure.
Visual impact	During construction, operation and decommissioning of the linear infrastructure the following general principles apply: • Land disturbance will be limited to what is absolutely necessary. • A significant portion of the permanent water supply pipeline will be buried and all associated above ground facilities (pump station, valves, 3311kV power line) will be positioned to limit visual impact. • Rehabilitation of areas will be done as soon as possible after the temporary and permanent infrastructure is no longer in use. • Dust plumes will be managed where possible to limit visual intrusion by dust. • Night lights will be used only where necessary and should be designed to illuminate only that which requires illumination. The use of standard high pole flood lights should be avoided where possible. • Litter will be prevented. • The tourism and recreation offsets will be implemented by Swakop Uranium in conjunction with MET (DWNP). These relate to the relocation of affected campsites in the NNNP, the maintenance of the gravel road that routes between the C28 and the big Welwitschia tourist site, the upgrade of the big Welwitschia tourist site.~~, a section of the Khan River.~~

Aspect/ Impact	Management Measure
Negative impacts on tourism and recreation	• Swakop Uranium will continue to meaningfully engage with relevant people and entities in the tourism, conservation and recreation sector to ensure that potential negative impacts from mining are managed in a way that the related impacts on tourism are acceptable. This engagement may be through new or existing collective structures and it will ideally involve other mining and exploration companies that have the potential to negatively impact on tourism in the NNNP, DNP and greater study area. • Subject to the DWNP agreement specific tourism offsets will be established by Swakop Uranium to provide the tourism and recreation sectors with alternate camping venues to the Welwitschia and Swakop River campsites. • In order to enhance the tourism experience at the big Welwitschia tourist site, Swakop Uranium will, subject to MET (DWNP) agreement, assist with the upgrade the big Welwitschia tourist facilities. In addition, Swakop Uranium will continue to assist with the maintenance of the gravel road that routes between the C28 and the Welwitschia plains. • Subject to the DWNP agreement, efforts will be made to preserve a similar length of the Khan River to that disturbed by the road and power line, to maintain the Khan River wilderness and camping experience. • The archaeology mitigation measures are implemented particularly in the vicinity of the Khan Mine.

Traffic and related safety impacts	• The relevant intersections at the C28 and the B2 will be upgraded and constructed to road traffic requirements. Both intersections will be clearly marked as mine turnoff points.
	• The recommended speed limits for the approaches to these intersections is 80 km/hour.
	• As part of the detailed design of the B2 intersection point, acceptable site distances will be considered that are:
	  o Relevant to the final approved road approach speeds.
	  o Acceptable if the final position of the intersection is moved for any reason.
	• The roads authority will be informed of the development in order to have input into the final design.
	• Trucks related to Swakop Uranium activities will be encouraged to use the salt road, the D1984 between Walvis Bay and Swakopmund.
	• Swakop Uranium will continue assisting MET (DWNP) with the maintenance of the gravel road that routes from the C28 past the Welwitschia plains to the Husab Mine Site. This is a departure from the Uranium Rush SEA recommendation that all roads carrying more than 250 vehicles a day must be tarred. The deviation is considered justified on the basis that the cumulative volume of vehicles is only expected to exceed the 250 per day limit one two days a week until the permanent access road is established for use by Husab Mine construction traffic.
	• Ensure basic road safety behaviour for all Husab Mine employees and contractors through training and awareness. Typical issues include:
	  o Keeping to safe speed limits, but as a minimum all specified road speeds will be adhered to.
	  o Ensuring that drivers all have valid licenses.
	  o Making sure that all vehicles are roadworthy.
	  o Zero tolerance for drinking and driving.

Aspect/ Impact	Management Measure
	○ Using lights appropriately for night driving. • Road accidents are considered emergencies and will be handled in accordance with the Husab Mine emergency response procedure.
Damage of heritage sites	Prior to construction the mine will ensure that: • An archaeological specialist is consulted regarding the final detailed planning and design process for all linear infrastructure components in order to ensure landscapes and finds of archaeological importance are avoided. • The Welwitsch station site will be surveyed in detail to produce documentary evidence of the site as it currently exists. Thereafter it may be reconstructed and preserved as an information centre, provided the DWNP wish this to happen. • Where possible, the historical narrow gauge railway line and the dump at the position of the old Khan station will be demarcated and/or cordoned off from the linear infrastructure and left undisturbed. • Where any archaeological sites will be disturbed and/or destroyed they will be subjected to detailed survey. This information will be used to apply for the necessary permits that are required in terms of the National Heritage Act 2004. • All workers (temporary and permanent) will be educated about the importance of preserving archaeological sites. • During all phases, the mine will ensure that it limits mine infrastructure, activities and related disturbance. • If there are any chance finds of archaeological sites that have not been identified and described in the specialist report, Swakop Uranium will follow its 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.

7.15.4 Linear Infrastructure Management Plans

Table 7-41: Linear Infrastructure Contractors Camps Management Plan

No	Issue	Management commitment
These commitments apply to construction only		
1	Duration and capacity	~~Temporary tented camps may be setup along the powerline, road and water pipeline routes. These camps will typically accommodate < 10 people.~~ Larger contractor camps may be established at a fixed location for the duration of the linear infrastructure construction period, if granted approval from the relevant authorities. It is preferable for occupants to be housed in nearby towns.
2	Occupants	Only construction workers and camp facility service personnel will be permitted to stay in the camp. No family or friends are allowed to stay.
3	Ablution facilities	Portable toilets and showers will be provided, with a mobile septic tank at temporary camps, and will be emptied and serviced regularly.
4	Cooking facilities	Gas cooking facilities will be provided. Grease traps will be provided at the bigger camps.
5	Water supply	Potable water to be provided by the contractor
6	Waste management	Domestic waste generated will be stored in weather-proof receptacles and disposed of at a permitted waste disposal facility. No waste will be burned or buried on site.
7	Work areas	The following work areas will be provided by the contractor: • Workshop and maintenance areas. • Stores for storing and handling fuel, lubricants, solvents, paints and construction materials. • Lay-down areas. • Mobile site offices. • Waste collection and storage areas. • Washbay for washing equipment and vehicles at the larger camps only. • Parking area for cars and equipment. These areas will be managed as follows: • Potentially polluting substances will be stored in properly bunded areas. • Spill kits will be kept on hand and relevant staff trained in its use. • Materials will be handled, used and stored in accordance with their respective MSDS sheets. • All spills will be cleaned up immediately. • Contaminated soil will be remediated in situ if possible, or disposed of as hazardous if in situ treatment is not possible. • Contaminated water will be contained at the workshop and maintenance areas, vehicle washbays and decontamination areas (not at temporary camps) and laydown areas; and disposed of with sewage effluent. • Waste will be stored in appropriate receptacles and disposed of at appropriately permitted disposal facilities.
8	Health, safety and environment	All camp occupants will receive induction on arrival. Health aspects relating to the desert conditions, HIV and AIDS etc will be regularly communicated. All camp facilities will be regularly cleaned and a high standard of hygiene maintained.

9	Security	Temporary camps will not be fenced. The bigger camps will be fenced and security will be provided.

Table 7-42: Access Roads Management Plan

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Construction: Trenches Borrow pits Scaffolding **Operation:** Bridge(s) crossing the Khan River and elevated road sections Maintenance activities **Decommissioning:** Trenches Piles of rubble Piles of scrap	Injury to third parties or animals	Prevent physical harm to humans, animals and birds from hazardous excavations and infrastructure.	**Construction, operation and decommissioning**: • Barriers and warning signs will be used to keep people and animals away from the hazardous excavations and infrastructure. • The bridge(s) and elevated sections of the permanent road will be equipped with barrier railings and warning signs to prevent people and animals from falling or jumping off the sides. • Borrow pits, trenches and stockpiles will be cordoned off with appropriate safety barricade ~~danger tape~~ until they are closed. • Information will be provided at stakeholder information meetings to educate the public about the dangers associated with hazardous excavations and infrastructure. • If people or animals sustain injuries as a result of the linear infrastructure, the Husab Mine emergency response procedure will be followed (Appendix C). • Traffic management plan to be completed and submitted for works to be done on access road, including routine maintenance.
Construction: Soil stripping Cleaning, grubbing and bulldozing Preparation of foundations Material and equipment movement Compacting bases Opening borrow pits and trenches Vehicle movement. **Operations:** Vehicle movement Servicing equipment Soil stockpile management **Decommissioning:** Soil stripping Cleaning and grubbing Material and equipment movement Slope stabilization Vehicle movement **Closure:**	Physical disturbance and of soil	Minimise the loss of soil resources and related functionality through physical disturbance, erosion and compaction.	**Construction and operations:** • Limit the disturbance of soils to what is necessary in terms of site clearing and in terms of on-going maintenance (servicing equipment) and use of vehicles. • Stockpiling areas will as close as possible to the source of the soil. • Soil stockpiles will be demarcated, and clearly marked to identify both the soil type and the intended area of rehabilitation. • Options for preventing erosion of stockpiles could include recreating the crusty layer, rock cladding/mulches/berms or establishment of vegetation ~~such as indigenous the Vetivier grass~~. • Soil stockpiles heights for linear infrastructure will be restricted to a maximum of 2 m. The stockpile sides should be stabilised as a slope of 1 in 6 or less. • No waste material will be placed on the soil stockpiles. • Equipment movement on top of the soil stockpiles will be limited. • Undertake regular monitoring of soils (stockpiles, in its natural state and rehabilitated areas) to ensure effective implementation of measures. • Preferably handle soils in dry weather conditions to prevent compaction. • The soil stripping depth along linear routes will be 500 mm where possible (minimum of 300 mm). • Utilizable soil (topsoil and upper portion of subsoil B2/1 Horizon), the lower "B"

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Erosion of rehabilitated areas			horizon (subsoil) and all decomposed rock/ soft overburden must be handled and stockpiled separately, where feasible. • The utilizable soil will be stripped and stockpiled together with any vegetation cover present. • Sequential restoration of the disturbed area must occur. i.e fresh topsoil is used to rehabilitate areas thereby limiting the need to create stockpiles for lengthy periods of time.
			Decommissioning (dependent on final closure planning): • Stockpiled soil will be used to rehabilitate disturbed sites. Either ongoing as disturbed areas become available for rehabilitation and/or at closure. The utilizable soil removed during the construction phase shall be redistributed to achieve an approximate uniform stable thickness consistent that is free draining and consistent with the approved final land use (low intensity wildlife grazing). A minimum layer of 300 mm of soil will be replaced. • A representative sampling of the stripped soils that are stored for a period of more than 6 months will be analysed to determine the nutrient status of the utilizable materials. As a minimum the following elements will be tested for: EC, CEC, pH, Ca, Mg, K, Na, P, Zn, Clay % and Organic Carbon. These elements provide the basis for determining the fertility of soil. Based on the analysis, fertilisers will be applied if necessary. • Erosion control measures will be implemented to ensure that the soil is not washed away and that erosion gulleys do not develop prior to vegetation establishment.
Construction: General construction activities Cement mixing Management of dirty water Storage and handling of new and used materials, chemicals and hydrocarbons Waste management Equipment servicing Use of vehicles and equipment that may leak lubricants and fuel. **Operations:**	Soil pollution		**Construction, operation and decommissioning:** • Ensure that all hazardous chemicals (new and used), dirty water, wastes are transported and handled in a manner that they do not spill. In this respect all containers must be intact and leak proof and stored in bunded areas. • Hazardous substances must be handled, used and disposed of according to their MSDSs. • If spills do occur and soil is contaminated, remediate in situ using an appropriate bioremediation agent • If in situ bioremediation is not possible, store contaminated soils and treat this waste

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Servicing equipment Storage and handling of new and used materials and chemicals (including hydrocarbons) Waste management Transportation of product and input chemicals. **Decommissioning:** General demolition activities Management of dirty water Storage and handling of new and used materials, chemicals and hydrocarbons Waste management (mineralised and non-mineralised) Equipment servicing Use of vehicles and equipment that may leak lubricants and fuel.			as hazardous (final appropriate disposal). • Major spillage incidents will be handled in accordance with the Husab emergency response procedure (refer to Appendix C).
Construction: Soil stripping Cleaning, grubbing and bulldozing Preparation of foundations Material and equipment movement Compacting bases Opening borrow pits and trenches General construction activities Storage and handling of new and used materials, chemicals and hydrocarbons Waste management (non-mineralised) Servicing equipment Use of vehicles and equipment that may leak lubricants and fuel Security lights Contractors camps Vehicle movement **Operations:** Vehicle movement	Physical destruction and general disturbance of biodiversity	Prevent, as far as is possible, the unacceptable loss of biodiversity and related functionality through physical destruction and general disturbance of fauna and flora.	**Construction management measures specific to the permanent road:** • A biodiversity specialist will shown the final detailed planning and design process for all linear infrastructure components to comment on the final routing and placement of infrastructure. In so doing landscapes and finds of biodiversity importance can be avoided in most cases. • Two options are being considered for the three permanent road crossings of the Khan River before the road exits the River and ascends to the Husab Mine site: concrete bridges or low level concrete drifts. The bridges will have the following approximate dimensions: 4-6 m high, 7.5 m wide and 120 m long. The drifts will be placed onto the riverbed and will have the following approximate dimensions: 7.5 m wide and 120 m long. • These river crossings will be designed in such as way as to allow the free movement of large animals such as Zebra, Kudu and Ostrich. • At these river crossings gabion mattresses will be installed to protect the river banks against erosion.

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Servicing equipment Soil stockpile management Elevated permanent road Bridge(s) Use of vehicles and equipment that may leak lubricants and fuel and that carry hazardous loads Security lights **Decommissioning:** Soil stripping Cleaning and grubbing Material and equipment movement Slope stabilization Vehicle movement General demolition activities Storage and handling of new and used materials, chemicals and hydrocarbons Waste management (non-mineralised) Servicing equipment Use of vehicles and equipment that may leak lubricants and fuel Security lights Contractors camps **Closure:** Erosion of rehabilitated areas			• If the low level crossing option is selected, erosion protection will include downstand beams along the edges of the concrete roadway slab and gabion box and gabion mattresses. • Minor drainage crossings will be achieved with the use of prefabricated pipe and box culverts. This is to prevent the loss of central Namib endemic species that prefer ephemeral washes, such as *Zygopyllum stapffii, Arthraerua leubnitziae* and *Hermbstaedtia spathulifolia*. • The planned culverts beneath the permanent road will allow water and nutrient flows to continue. • Energy dissipaters will be used to prevent water flows from channelling and eroding the river bed adjacent to the road and culverts. • Underpasses and overpasses will be provided at regular intervals on the elevated road in the Khan River and its tributaries. The design of these passes and intervals will be shown to an ecology specialist for comment. • The road route will be scouted and marked out ahead of the construction crew and all reasonable efforts will be made to avoid nesting/breeding sites and large trees and bushes. • Along the route individuals or groups of species of conservation concern (e.g. *Commiphora saxicola, Lithops ruschiorum, Aloe asperifolia, Hoodia* spp.) will be noted and avoided as far as possible. Where this is not possible, those that are suited for relocation will be rescued after obtaining the relevant permissions from MET. • Large trees of protected species (i.e. *Acacia erioloba, Faidherbia albida, leadwood, Maurua tree*) in the Khan River or its affected tributaries will be mapped and individually be accounted for when finalising the road route, taking into consideration the permanent power line route. Damage to these trees will be avoided as far as possible, because they are both protected and keystone species. If any of these protected species need to be removed the relevant permits will be obtained from MET. • Obstruction of the movement of animals along the Khan River should be avoided.

Activity/ Project Component	Potential impact	Management Objective	Management Measure
			~~**Construction management measures specific to the temporary road:**~~ • ~~The road route will be planned in detail in such a way as to minimise the number of individual *Welwitschia mirabilis* that will be affected. This will be achieved through mapping and marking the route ahead of the road construction crew and making small adjustments where possible.~~ • ~~Water flowing in washes that provide water to the Welwitschia populations will not be impeded.~~ • ~~Construction crews will be provided with information on Welwitschia and no-go areas (as per Figure 7-1)~~ • ~~The road route will be scouted and marked out ahead of the construction crew and all reasonable efforts will be made to avoid nesting/breeding sites and large trees and bushes.~~
			~~**Operations management measure specific to the temporary road:**~~ • ~~Part of the temporary access road may have to accommodate tourist traffic as well. As soon as the road surface becomes rutted or corrugated, drivers will be tempted to travel off-road, leading to potentially larger impacts on the Welwitschias. The road will therefore be maintained in good condition and graded regularly.~~
			Construction, operation and decommissioning phase management conditions applicable to the temporary and permanent roads: • Limit linear infrastructure, activities and related disturbance to an absolute minimum. • Construction areas will be clearly demarcated. • Construction activities in the Khan River, Swakop River and tributaries will preferably start after sunrise and finish before sunset so that the disturbance at dusk and dawn for animal and bird movement is reduced. • Water flowing in washes that provide water to the Welwitschia populations will not be impeded. • Monitoring and auditing of the performance of construction teams in the designated red flag areas will be conducted by Husab Environmental ~~Department~~ Section personnel on a weekly basis. Where the construction teams have not complied with

Activity/ Project Component	Potential impact	Management Objective	Management Measure
			the EMP the contractor will be held responsible for making good. • Rehabilitation and restoration will be initiated in areas where construction has been completed as soon as possible. This will include follow up audits and monitoring in the short and long term to determine the success of the rehabilitation and restoration. • River crossings and the areas adjacent to the access roads will be checked following rain for erosion and remedial action taken as required. • Implement an alien/invasive/weed management programme to control the spread of invader plants onto and from disturbed areas. • If irreplaceable biodiversity will be permanently lost and restoration is not possible, a biodiversity offset will be investigated. • Training will be provided to all workers about the sensitivity of biodiversity and the potential impacts to biodiversity and how these must be avoided, as well as "No-Go" zones (as per Figure 7-1) • To prevent high insect mortality, the use of light will be kept to a minimum, and where it is required, yellow lighting will be used. Vertebrates will be kept away from the lighted areas with appropriate fencing where feasible. • There will be zero tolerance to the killing or collecting of any biodiversity (including the collection of wood). In this regard, the locations of species of concern will not be marked or advertised. Offenders will be prosecuted. • Sand collection from the Swakop and Khan Rivers for building purposes in the vicinity of linear infrastructure will ~~be minimised~~ not be tolerated. • Occupants of the temporary accommodation camps will be required to remain within the camp after working hours. • All camps will be supplied with sufficient cooking equipment so that the collection of fire wood is not required for this purpose. • Strict speed control measures will be applied for any vehicles driving within the NNNP and DNP boundaries. • No off road driving will be allowed unless in emergencies. • No night driving will be permitted unless authorised by NNNP authorities or in

Activity/ Project Component	Potential impact	Management Objective	Management Measure
			emergency situations. • Noisy equipment will be well maintained to control noise emission levels. • Water reservoirs will be enclosed containers or netted in order to prevent access by birds and animals. • Dust control measures will be implemented. • Pollution prevention measures will be implemented to prevent soil and water pollution. • Dust suppression will be undertaken where and when necessary and dust levels will be monitored. • All animal mortalities on roads will be recorded on a standardized form, with the GPS and other details and photographs • Fixed point photographic monitoring of strategic location(s) ~~section~~ along road routes will be conducted before, during and after construction to record and assess habitat change. • Major spillage incidents will be handled in accordance with the Husab Mine emergency response procedure. • Certain instances of injury to animals may be considered emergency situations. These will be managed in accordance with the Husab Mine emergency response procedure (refer to Appendix C). • Provision will be made for post closure monitoring to assess the effectiveness of rehabilitation and restoration and to implement additional measures where required. • Swakop Uranium will contribute towards resourcing additional biodiversity studies. A priority in this regard is a study to understand more about the movement and associated processes of large mammals and the Common Ostrich.
			Decommissioning management measures for the temporary road: • A rehabilitation plan will be developed that will contain clear objectives, a strategy, a work plan, a monitoring plan and management response guidelines. • Construction of all linear infrastructure types will result in disturbance of soil along the line of the route. Rehabilitation is therefore aimed at the repair of pre-existing topography. • Natural water flows will be re-instated where required.

Activity/ Project Component	Potential impact	Management Objective	Management Measure
			• The area will be allowed to re-vegetate and monitored to ensure adequate cover is attained within two rainy seasons. • Plants rescued before construction will be reintroduced if possible.
Construction: General construction activities Cement mixing Management of dirty water Storage and handling of new and used materials, chemicals and hydrocarbons Waste management (non-mineralised) Equipment servicing Use of vehicles and equipment that may leak lubricants and fuel **Operations:** Servicing equipment Storage and handling of new and used materials and chemicals (including hydrocarbons) Waste management (mineralised and non-mineralised) Transportation of product and input chemicals **Decommissioning:** General building activities Management of dirty water Storage and handling of new and used materials, chemicals and hydrocarbons Waste management (mineralised and non-mineralised) Equipment servicing Use of vehicles and equipment that may leak lubricants and fuel	Water pollution	Prevent pollution of surface water run-off and related health impacts on downstream users of surface and sub-surface (groundwater) water	**Construction, operation and decommissioning:** • All hazardous chemicals (new and used), dirty water, non-mineralised wastes, and product will be handled and transported in a manner that they do not contaminate surface water run-off or near surface water flow. Refer to the relevant surface, groundwater and soil management plans in preceding sections of this report (Sections 7.5 and 7.6). • On-going water quality monitoring in the Swakop and Khan Rivers will be done to track possible pollution trends and related risks (refer to Section 9.2). If pollution is detected, remediation steps will be implemented with the input of relevant specialists and government departments. • Major spillage incidents that can contaminate water resources will be handled in accordance with the Husab Mine emergency response procedure (see Appendix C).
Construction: Construction of access road	Interference with flow in	Prevent impedance or	**Construction:** • Construct the relevant number of bridges and culverts along the route of the access

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Operations: Use and maintenance of access road **Decommissioning:** General rehabilitation activities	watercourses	interference to flow in watercourses	road to ensure as natural a flow as is possible in the Khan River and tributaries. • The road should be elevated above the riverbed where the road traverses the main watercourse beds of Catchments 2 and 3 and the Khan River – without impeding the movement of animals. • Accurate three dimensional design of access geometry should be conducted during the detailed design of the road in order to optimise the elevation of the access road surface over existing ground along its intended route in the Khan River valley. • The access road will be preferentially aligned along the north-eastern side of the main watercourses in Catchments 2 and 3 in order to reduce the potential impact of canalisation. **Operations:** • Natural drainages crossing the temporary road and Welwitschia Drive should be routinely assessed and opened up where sand walls/berms have blocked them due to usage and grading activities, in order to let water flow freely.
Construction: Soil stripping Cleaning and grubbing Preparation of the foundations Compacting bases Opening borrow pits and trenches Operation of asphalt plant General building activities Vehicle movement and exhaust fumes Diesel generators Limited drilling and blasting **Operations:** Vehicle movement and exhaust fumes Soil management activities **Decommissioning:** Removal of infrastructure Vehicle movement and exhaust fumes General material handling Soil management activities Diesel generators	Air pollution	Limit the mine's contribution to cumulative air pollution impacts	**Construction, operational and decommissioning:** • Dust suppression on the temporary gravel road combined with vehicle speed controls to achieve a control efficiency of 90 %. • Dust controls at the crushing and screening operation (for road building) to achieve 50 % control efficiency. • Dust controls at excavation, scraping, and material handling points (loading and offloading) by to achieve 50 % control efficiency. • In addition to the planned monitoring and auditing programme that was included in the initial EMP, Swakop Uranium will implement a source-based dust fallout performance indicator of a maximum of 1200 mg/m^2/day in the immediate vicinity of the temporary gravel road, the road material crushing operation, and excavation, scraping and material tipping points. • Vehicles and equipment will be maintained in good working order in order to minimise exhaust fumes. • Quarterly ~~performance audits and~~ inspections will be done to verify that the monitoring is taking place according to specifications and that the Swakop Uranium is adhering to the specified dust fallout indicators. • If used, diesel generators will be operated and maintained according to supplier specifications and the IFC emission limits. • The tourism and recreation offsets (to be described below) will be implemented. These relate to the relocation of affected campsites in the NNNP, the maintenance

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Closure: Wind erosion of rehabilitated areas.			of the gravel road that routes between the C28 and the big Welwitschia tourist site, the upgrade of the big Welwitschia tourist site, and where required (with the agreement of DWNP) to conserve a section of the Khan River (downstream) of the new road and bridge so that tourists and recreation seekers that will be affected by the Khan River linear infrastructure will have alternative options for accessing areas with similar wilderness experiences in the Khan River ~~preservation of a section of the wilderness Khan River.~~ • As part of closure planning the rehabilitation designs will incorporate measures to address long term pollution prevention and confirmatory monitoring.
Construction: Generators Vehicle movement Earth moving equipment Crushing and screening General building activities Limited drilling and blasting **Operations:** Vehicle movement Infrastructure maintenance **Decommissioning:** Vehicle movement Earth moving equipment Material tipping Generators	Noise pollution	Limit noise pollution impacts	**Construction, operations and decommissioning:** • All registered complaints will be documented, investigated and efforts made to address the area of concern where possible. • The tourism and recreation offsets (to be described below) will be implemented. • Construction activities and traffic will preferentially be limited to the daylight hours between sunrise and sunset. This is particularly relevant in the NNNP and the Khan River and tributary valleys on the weekends when tourists and members of the public may be camping overnight.
Construction: Limited blasting for widening valleys on the permanent road	Damage to third party infrastructure or injury to third parties or animals due to blasting	Prevent blast related damage and injuries to third parties, animals and infrastructure	**Construction of permanent road:** • The blast design, implementation and monitoring will, as a general rule, ensure that: o Fly rock is contained within 500 m of the blast site. o Ground vibration at the closest third party structures (granite quarries, Arandis airport and Rössing Uranium Mine) is less than 12 mm/s peak particle velocity. o Air blast at the closest third party structures (Rössing Uranium Mine) is less than 130 dB. • Prior to each blast the area within a 1 km radius of the blast site will be cleared of third parties. Prior to each blast an audible warning will be sounded.

Activity/ Project Component	Potential impact	Management Objective	Management Measure
			• All registered complaints will be documented, investigated and efforts made to address the area of concern where possible. • If a person or animal is injured by fly rock this must be handled in accordance with the Husab Mine emergency response procedure (refer to Appendix C).
Construction: Foundations Trenches Stockpiles Scaffolding at bridge crossing Cranes Borrow pits Construction camps Partially built permanent road Dust plumes **Operations:** Permanent road **Decommissioning:** Trenches Piles of rubble Piles of scrap Contractor camps Dust plumes	Visual impact	Limit visual impacts on tourism and recreation activities	**Construction, operation and decommissioning:** • The final detailed planning and design for all linear infrastructure components will assess potential visual impacts and, in so doing, landscapes of visual importance can mostly be avoided. This includes the sections of infrastructure that traverse the old Khan Mine site which is used for commercial filming. • Land disturbance will be limited to what is absolutely necessary. • A significant portion of the permanent water supply pipeline will be buried and all associated above ground facilities (pump station, valves, 3311kV power line) will be positioned to limit the visual impact. • Rehabilitation of areas will be done as soon as possible after the temporary and permanent infrastructure is no longer in use. • All dust plume sources will be managed as far as is possible to limit visual intrusion by dust. • Night lights will be used only where necessary and will be designed to illuminate only that which requires illumination. The use of standard high pole flood lights will be avoided where possible. • No littering will be permitted. • The tourism and recreation offsets (to be described below) will be implemented.
Construction: Foundations Trenches Stockpiles Scaffolding at bridge crossing Cranes Borrow pits Crushing and screening Equipment movement Generators Construction camps	Negative socio-economic impacts on tourism and recreation	Limit the negative socio-economic impacts on tourism and recreation	**Construction, operation and decommissioning:** • Swakop Uranium will continue to meaningfully engage with relevant people and entities in the tourism, conservation and recreation sector to ensure that potential negative impacts from mining are managed in a way that the related impacts on tourism are acceptable. This engagement will ideally also involve other mining and exploration companies that have the potential to negatively impact on tourism in the NNNP, DNP and greater study area. • Specific tourism offsets will be established by Swakop Uranium in conjunction with MET (DWNP). These offsets will provide the tourism and recreation sectors with equivalent or better facilities and experiences currently associated with the Welwitschia and Swakop River campsites. • In order to enhance the tourism experience at the big Welwitschia tourist site,

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Temporary road and traffic Partially built permanent road Temporary and permanent power lines Temporary and permanent pipelines Lights at substations Dust plumes Limited drilling and blasting **Operations:** Above ground components of permanent pipeline Permanent power lines Permanent road and traffic Backup road and traffic Permanent substation and associated lights **Decommissioning:** Trenches Piles of rubble Piles of scrap Contractor camps Dust plumes Vehicle and equipment movement			Swakop Uranium will, with the approval of MET (DWNP), assist with the upgrading of the big tourist Welwitschia facilities. In addition, Swakop Uranium will continue to assist with the maintenance of the D1903 gravel road that routes between the C28 and the Welwitschia plains. • Swakop Uranium will work together with MET (DWNP) to actively conserve an identified section of the Khan River downstream so that tourists and recreation seekers that will be affected by the Khan River linear infrastructure will have alternative options for accessing areas with similar wilderness experiences in the Khan River. • The archaeology mitigation measures (to be described below) will be implemented particularly near of the old Khan Mine.
Construction: Construction traffic Temporary access road **Operations:** Operation traffic Permanent access road Backup access road **Decommissioning:** Deconstruction traffic Permanent and backup access roads	Increase in traffic and related safety impacts	Reduce the potential for safety and vehicle related impacts on road users	**Construction, operations and decommissioning:** • The relevant intersections at the C28 and the B2 will, as a minimum, be upgraded and constructed respectively in a manner similar to that shown on Figure 7-3 and Figure 7-4. Both intersections will be clearly marked as mine turnoff points. • The speed limit for the approaches to these intersections will be 80 km/hour. • As part of the detailed design of the B2 intersection point, consideration will be given to acceptable site distances that are: o Relevant to the final approved road approach speeds. o Acceptable if the final position of the intersection is moved for any reason. • The roads authority will be informed of the development in order to have input into the final designs. • Trucks related to Swakop Uranium activities will be encouraged to use the salt road,

Activity/ Project Component	Potential impact	Management Objective	Management Measure
			the D1984 between Walvis Bay and Swakopmund. • Swakop Uranium will continue assisting MET (DWNP) with the maintenance of the gravel road that routes from the C28 past the Welwitschia plains to the Husab Mine Site. This is a departure from the Uranium Rush SEA recommendation that all roads carrying more than 250 vehicles a day must be tarred. The deviation is considered justified on the basis that the cumulative volume of vehicles is only expected to exceed the 250 per day limit one two days a week until the permanent access road is established for use by Husab Mine construction traffic. • Ensure basic road safety behaviour for all Husab Mine employees and contractors through training and awareness. Typical issues include: ○Keeping to safe speed limits, but as a minimum all specified road speeds will be adhered to. ○Ensuring that drivers all have valid licenses. ○Making sure that all vehicles are roadworthy. ○Zero tolerance for drinking and driving. ○Using lights appropriately for night driving. • Road accidents are considered emergencies and will be handled in accordance with the Husab Mine emergency response procedure (refer to Appendix C).
Construction: Soil stripping Cleaning, grubbing and bulldozing Preparation of foundations Material and equipment movement Compacting bases Opening borrow pits and trenches Vehicle movement Limited drilling and blasting **Operation:** Vehicle movement Servicing equipment and infrastructure Soil stockpile management **Decommissioning:** Demolition of infrastructure Material and equipment movement	Damage to archaeological sites	Prevent the unacceptable loss of archaeological sites and related historical information	**Planning (prior to construction):** • An archaeological specialist is consulted regarding the final detailed planning and design process for all linear infrastructure components in order to ensure landscapes and finds of archaeological importance are avoided. • ~~The Welwitsch station site will be surveyed in detail to produce documentary evidence of the site. Thereafter it will be reconstructed and preserved as an information centre under the guidance of an archaeological specialist.~~ • The Welwitsch station site will be surveyed in detail to produce documentary evidence of the site as it currently exists. Thereafter it may be reconstructed and preserved as an information centre, provided the DWNP wish this to happen. • Where possible, the historical narrow gauge railway line and the dump at the position of the old Khan station will be demarcated and/or cordoned off from the linear infrastructure and left undisturbed. • Where any archaeological sites will be disturbed and/or destroyed they will be subjected to detailed survey. This information will be used to apply for the necessary permits that are required in terms of the National Heritage Act 2004. • All workers (temporary and permanent) will be educated about the importance of

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Slope stabilization			preserving archaeological sites.
Vehicle movement Stockpiles of scrap and rubble			**Construction, operations and decommissioning:** • The mine will ensure that it limits mine infrastructure, activities and related disturbance. If there are any chance finds of archaeological sites that have not been identified and described in the specialist report, Swakop Uranium will follow its 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.

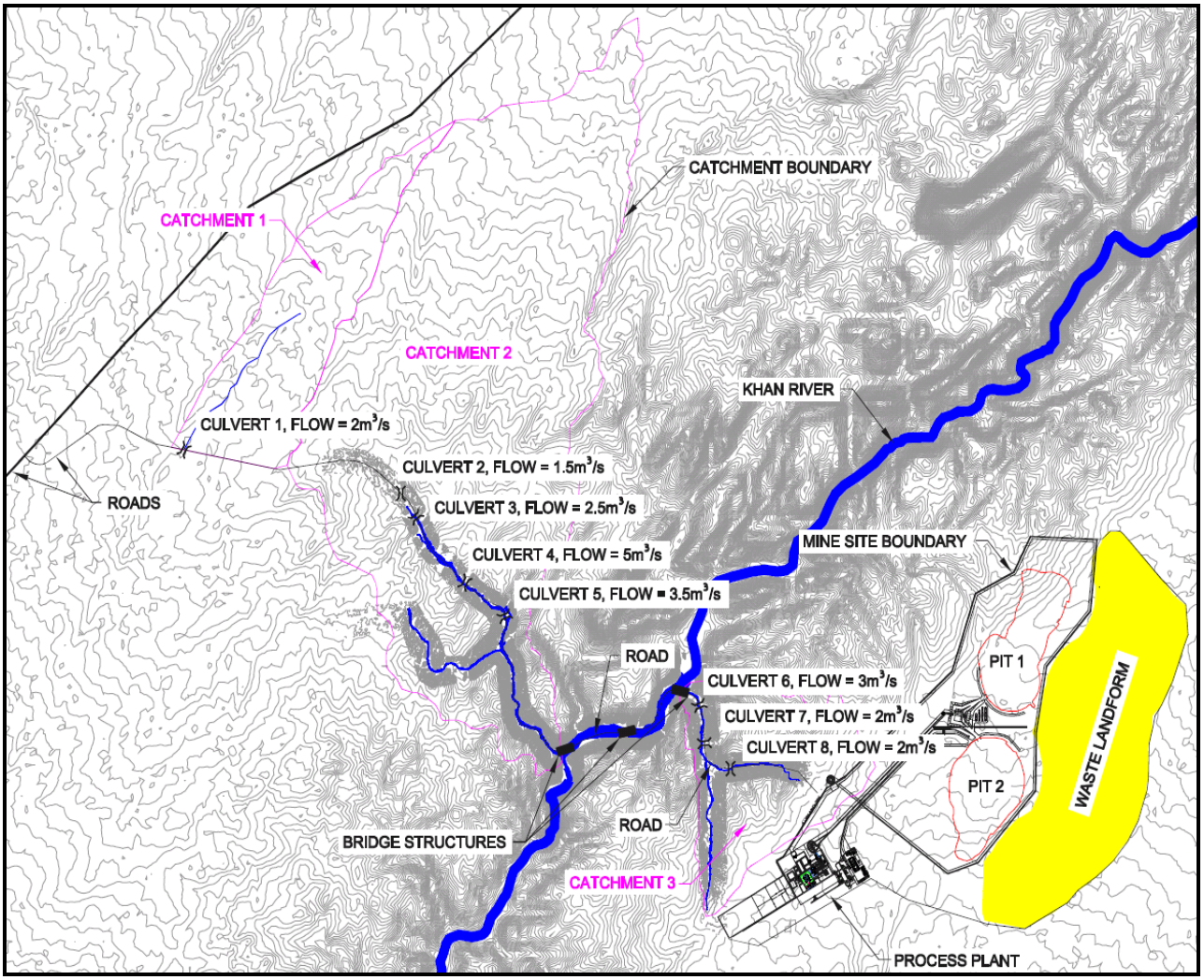

Figure 7-2: Recommended Locations of Bridges, Culverts and Design Flow Rates (Metago, 2011)

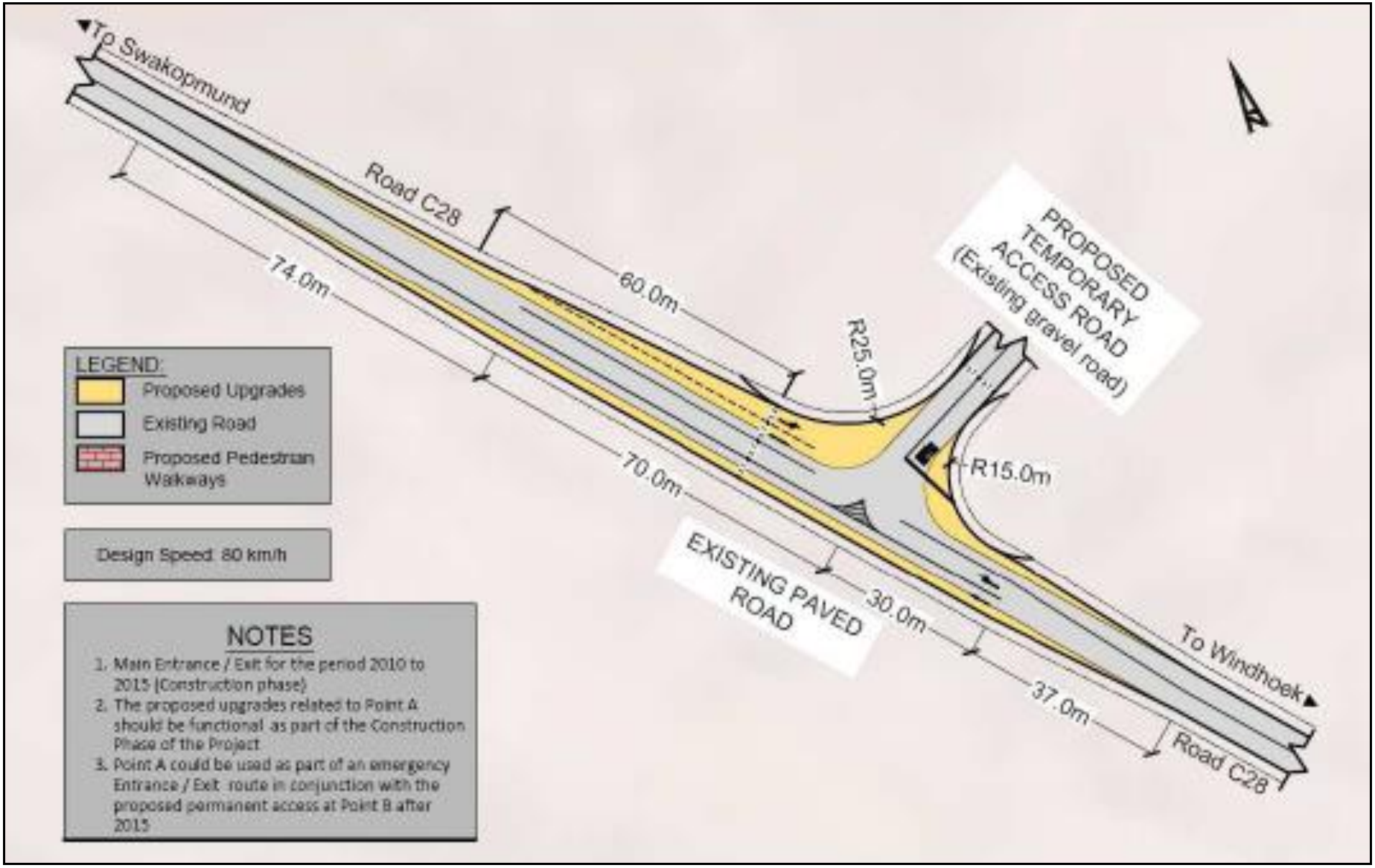

Figure 7-3: Recommended Upgrading of the Intersection of the C28 and the Temporary Access Road (Siyazi, 2010)

Figure 7-4: Recommended Upgrading of the Intersection of the B2 and the Permanent Access Road (Siyazi, 2010)

Table 7-43: Water Supply Infrastructure Management Plan

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Construction: Trenches Borrow pits Scaffolding **Operation:** Elevated sections of the permanent water pipeline Reservoirs along water pipelines **Decommissioning:** Trenches Piles of rubble Piles of scrap	Injury to third parties or animals	Prevent physical harm to humans, animals and birds from hazardous excavations and infrastructure.	**Construction, operation and decommissioning**: • Barriers and warning signs will be used to keep people and animals away from the hazardous excavations and infrastructure. • The reservoirs will be enclosed to prevent drowning. • Borrow pits, trenches and stockpiles will be cordoned off with appropriate safety barricade ~~danger tape~~ until they are closed. • Information will be provided at stakeholder information meetings to educate the public about the dangers associated with hazardous excavations and infrastructure. • If people or animals sustain injuries as a result of the linear infrastructure, the Husab emergency response procedure will be followed (refer to Appendix C).
As listed above in Table 7-41	Physical disturbance and of soil	Minimise the loss of soil resources and related functionality through physical disturbance, erosion and compaction.	As listed above in Table 7-41
As listed above in Table 7-41	Soil pollution		As listed above in Table 7-41
Construction: Soil stripping Cleaning, grubbing and bulldozing Preparation of foundations Material and equipment movement Compacting bases	Physical destruction and general disturbance of biodiversity	Prevent, as far as is possible, the unacceptable loss of biodiversity and related functionality through physical destruction and	**Construction and operations management measures for the temporary and permanent pipelines:** • Bury permanent pipeline below ground; where this is not possible, ensure that adequately sized over- or underpasses are constructed at regular intervals along the line. • Limit linear infrastructure, activities and related disturbance to an absolute minimum. • A biodiversity specialist will be shown the final detailed planning and design

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Opening borrow pits and trenches Vehicle movement General construction activities Storage and handling of new and used materials and chemicals (including hydrocarbons) Waste management (non-mineralised) Servicing equipment Use of vehicles and equipment that may leak lubricants and fuel Security lights Contractors camps **Operations:** Vehicle movement Servicing equipment Soil stockpile management Above ground pipeline Servicing equipment Vehicle movement on access roads and off road Use of vehicles and equipment that may leak lubricants and fuel and that carry hazardous loads Security lights **Decommissioning:** Soil stripping		general disturbance of fauna and flora.	process for all linear infrastructure components to comment on the final routing and placement of infrastructure. In so doing landscapes and finds of biodiversity importance can be avoided in most cases. • Construction areas will be clearly demarcated. • Construction activities will preferably start after sunrise and finish before sunset so that the disturbance at dusk and dawn for animal and bird movement is reduced. • Monitoring and auditing of the performance of construction teams in the designated red flag areas will be conducted by Husab Environmental Section personnel on a weekly basis. Where the construction teams have not complied with the EMP the contractor will be held responsible. ~~for making good.~~ • Rehabilitation and restoration will be initiated in areas where construction has been completed as soon as possible. This will include follow up audits and monitoring in the short and long term to determine the success of the rehabilitation and restoration. • River crossings will be checked following rain for erosion and remedial action taken as required. • Implement an alien/invasive/weed management programme to control the spread of invader plants onto and from disturbed areas. • Training will be provided to all workers about the sensitivity of biodiversity and the potential impacts to biodiversity and how these must be avoided, as well as "No-Go" zones (as per Figure 7-1). • To prevent high insect mortality, the use of light will be kept to a minimum, and where it is required, yellow lighting will be used. Vertebrates will be kept away from the lighted areas with appropriate fencing where feasible. • There will be zero tolerance to the killing or collecting of any biodiversity (including the collection of wood). In this regard, the locations of species of concern will not be marked or advertised. Offenders will be prosecuted. • Sand collection from the Swakop and Khan Rivers for building purposes in the vicinity of linear infrastructure will ~~be minimised~~ not be tolerated.

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Cleaning and grubbing Material and equipment movement Slope stabilization Vehicle movement General demolition activities Storage and handling of new and used materials and chemicals (including hydrocarbons) Waste management (non-mineralised) Servicing equipment Use of vehicles and equipment that may leak lubricants and fuel Security lights Contractors camps **Closure:** Erosion of rehabilitated areas.			• Occupants of the temporary accommodation camps will be required to remain within the camp after working hours. • All camps will be supplied with sufficient cooking equipment so that the collection of fire wood is not required for this purpose. • Strict speed control measures are used for any vehicles driving within the NNNP and DNP boundaries. A special reduced speed limit (perhaps 60 km/hour) will be implemented for the permanent access road in the Khan River and associated tributaries where animal and bird concentration is highest. No off road driving will be allowed. • No off road driving will be allowed unless in emergencies. • No night driving will be permitted unless authorised by NNNP authorities or in emergency situations. • Noisy equipment will be well maintained to control noise emission levels. • Water reservoirs will be enclosed containers or netted in order to prevent access by birds and animals. • Dust control measures are implemented. • Implement pollution prevention measures to prevent soil and water pollution. • Dust suppression will be conducted regularly and dust levels monitored. • Monitor movement of animals at strategic points - such as the bridge over the Khan, as well as at all springs and gully-heads; document and disseminate this information (there is a need to better understand these types of impacts). • Monitor use of over- or underpasses by animals and adapt design if necessary. • Monitor rehabilitation and restoration activities as per restoration plan. • Map the extent and contiguousness (and other relevant landscape parameters) of habitats before, during and after construction. • All animal mortalities will be recorded on a standardized form, with the GPS and other details and photographs. • Major spillage incidents will be handled in accordance with the Husab mine emergency response procedure. • Certain instances of injury to animals may be considered emergency situations.

Activity/ Project Component	Potential impact	Management Objective	Management Measure
			These will be managed in accordance with the Husab emergency response procedure. • Swakop Uranium will contribute towards resourcing additional biodiversity studies. A priority in this regard is a study to understand more about the movement and associated processes of large mammals and possibly the Common Ostrich.
			Temporary abstraction of water from the Swakop River (when applicable) **~~Operation management measures for temporary temp pipeline~~:** • Record population size and density of selected indigenous trees in a buffer zone around the boreholes (size of buffer zone to be determined in consultation with hydrologist). • Continuous measurement of water table depth and rates of change in this – refer to section 9.2. • Measurement of xylem pressure potential, or any other appropriate indicator of physiological integrity, of selected trees at regular intervals (preferably weekly intervals, relaxing this later if indicated).
			Decommissioning management measures for the temporary water supply infrastructure: • A rehabilitation plan will be developed that will contain clear objectives, a strategy, a work plan, a monitoring plan and management response guidelines. • Construction of all linear infrastructure types will result in disturbance of soil along the line of the route. Rehabilitation is therefore aimed at the repair of pre-existing topography • Natural water flows will be re-instated where required. • The area will be allowed to re-vegetate and monitored to ensure adequate cover is attained within two rainy seasons. • Plants rescued before construction will be reintroduced if possible.
As listed above in Table 7-41.	Water pollution	Pollution of surface water run-off and related health impacts on	As listed above in Table 7-41.

Activity/ Project Component	Potential impact	Management Objective	Management Measure
		downstream users of surface and sub-surface water (groundwater)	
Construction: Soil stripping Cleaning and grubbing Preparation of the foundations Compacting bases Opening borrow pits and trenches Operation of asphalt plant General building activities Vehicle movement and exhaust fumes Diesel generators Limited drilling and blasting **Operations:** Vehicle movement and exhaust fumes Soil management activities **Decommissioning:** Removal of infrastructure Vehicle movement and exhaust fumes General material handling Soil management activities Diesel generators **Closure:** Wind erosion of rehabilitated	Air pollution	Limit the mine's contribution to cumulative air pollution impacts	**Construction, operational and decommissioning:** • Dust controls at excavation, scraping, and material handling points (loading and offloading) to achieve 50 % control efficiency. • Vehicles and equipment will be maintained in good working order in order to minimise exhaust fumes. • If used, diesel generators will be operated and maintained according to supplier specifications and the IFC emission limits. • The tourism and recreation offsets (to be described below) will be implemented. These relate to the relocation of affected campsites in the NNNP, the maintenance of the gravel road that routes between the C28 and the big Welwitschia tourist site, the upgrade of the big Welwitschia tourist site, and the preservation of a section of the Khan River. • As part of closure planning, the rehabilitation designs will incorporate measures to address long term pollution prevention and confirmatory monitoring.

Activity/ Project Component	Potential impact	Management Objective	Management Measure
areas.			
As listed above in Table 7-41.	Noise pollution	Limit noise pollution impacts	As listed above in Table 7-41.
Construction: Foundations Trenches Stockpiles Cranes Borrow pits Construction camps All pipelines Dust plumes **Operations:** Above ground components of permanent pipeline **Decommissioning:** Trenches Piles of rubble Piles of scrap Contractor camps Dust plumes	Visual impact	Limit visual impacts on tourism and recreation activities	As listed in Table 7-41
Construction: Foundations Trenches Stockpiles Cranes Borrow pits Crushing and screening Equipment movement Generators	Negative socio-economic impacts on tourism and recreation	Limit the negative socio-economic impacts on tourism and recreation	As listed in Table 7-41.

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Construction camps All pipelines Dust plumes Limited drilling and blasting **Operations:** Above ground components of permanent pipeline **Decommissioning:** Trenches Piles of rubble Piles of scrap Contractor camps Dust plumes Vehicle and equipment movement			
As listed in Table 7-41.	Increase in traffic and related safety impacts	Reduce the potential for safety and vehicle related impacts on road users	As listed in Table 7-41.
As listed in Table 7-41.	Damage to archaeological sites	Prevent the loss of archaeological sites and related historical information	As listed in Table 7-41.

Table 7-44: Power Supply Infrastructure Management Plan

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Construction: Trenches Borrow pits Scaffolding **Operation:** Elevated sections of the permanent water pipeline Reservoirs along water pipelines **Decommissioning:** Trenches Piles of rubble Piles of scrap	Injury to third parties or animals	Prevent physical harm to humans, animals and birds from hazardous excavations and infrastructure.	**Construction, operation and decommissioning**: • Barriers and warning signs will be used to keep people and animals away from the hazardous excavations and infrastructure. • The substations will be equipped with fences and warning signs. • Specific pylons and poles will be equipped with warning signs and/or base barriers to deter people from climbing up these structures. • Borrow pits, trenches and stockpiles will be cordoned off with appropriate safety barricade ~~danger tape~~ until they are closed. • Information will be provided at stakeholder information meetings to educate the public about the dangers associated with hazardous excavations and infrastructure. • If people or animals sustain injuries as a result of the linear infrastructure, the Husab emergency response procedure will be followed (refer to Appendix C). • Measures to limit bird facilities will be implemented as discussed below (biodiversity section of this table).
As listed above in Table 7-41	Physical disturbance and of soil	Minimise the loss of soil resources and related functionality through physical disturbance, polution erosion and compaction.	As listed above in Table 7-41
As listed above in Table 7-41	Soil pollution		As listed above in Table 7-41
Construction: Soil stripping Cleaning, grubbing and bulldozing Preparation of foundations Material and equipment movement Compacting bases	Physical destruction and general disturbance of biodiversity	Prevent, as far as is possible, the unacceptable loss of biodiversity and related functionality through physical destruction and	**Construction management measures associated with the ~~temporary 66k V and permanent~~ 33 ~~11~~ kV power supply infrastructure:** • The following measures will be implemented (~~in liaison with NamPower as the owner of the servitude and the powerline infrastructure~~) to limit bird fatalities: • ~~The 66 kV line will be routed through the Khan Mine valley to limit impacts on the old mine, to avoid the spring and eastern cliffs.~~ • ~~The Khan River crossing should be perpendicular to the river, as far as possible,~~

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Opening borrow pits and trenches Vehicle movement General construction activities Storage and handling of new and used materials and chemicals (including hydrocarbons) Waste management (non-mineralised) Servicing equipment Use of vehicles and equipment that may leak lubricants and fuel Security lights Contractors camps **Operations:** Vehicle movement Servicing equipment Soil stockpile management Servicing equipment Vehicle movement on access roads and off road Use of vehicles and equipment that may leak lubricants and fuel and that carry hazardous loads Security lights Transmission of electricity **Decommissioning:** Soil stripping		general disturbance of fauna and flora.	~~to maximise visibility and minimise the crossing distance; it should also coincide with the crossing point of the permanent 132 kV 220 kV line, as far as possible.~~ • ~~Wooded areas will be avoided where possible, and in particular the many trees in the eastern section of the Khan River~~ • Single wooden monopoles topped with an A-frame structure for carrying the insulators will be used for the ~~66kV temporary line and the~~ 3311kV temporary and/or permanent line rather than H-frame structures; however, H-frame structures will be used for straining. • NamPower will be consulted for the latest mitigations and overall management of the risks. Deflectors will be used in strategic places to improve the visibility during day and night times of the 33 kV power line to birds. • ~~A-frame structures will be used for the 66kV temporary line and the 11kV permanent line rather than H-frame structures; however, H-frame structures will be used for straining.~~ • ~~The use of stay wires should be minimised on both lines;~~ • ~~All stay wires on both lines should be marked with a combination of white and red or black spiral vibration dampers.~~ • ~~Spiral double loop flight diverters (alternating black and white) should be fitted to top conductors on the 66kV line where it routes in and through the Khan River valley, and on top conductors of both the 66kV and 11kV lines where they route across any other bird flight paths.~~ • ~~In addition to spiral double loop flight diverters, some form of illumination should be fitted to top conductors on the 66kV line for its entire length where it routes in and through the Khan River valley, and to top conductors of both the 66kV and 11kV lines where they route across any other bird flight paths.~~ • ~~Top conductors on the entire length of both the 11kV line and the 66kV line in the Khan Mine Valley should also be fitted with spiral double loop flight diverters, to mitigate against korhaan collisions.~~ • ~~Where there is a need to place power line infrastructure on higher ground so that it protrudes above the valleys, the conductors should be fitted with some form of illumination as well as spiral double loop flight diverters across all~~

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Cleaning and grubbing Material and equipment movement Slope stabilization Vehicle movement General demolition activities Storage and handling of new and used materials and chemicals (including hydrocarbons) Waste management (non-mineralised) Servicing equipment Use of vehicles and equipment that may leak lubricants and fuel Security lights Contractors camps **Closure:** Erosion of rehabilitated areas.			~~potential bird flight paths.~~ • ~~Raptor protectors (or some suitable alternative) should be installed on all top insulators on the 66kV A-frame line in the vicinity of vulture roosting sites; this applies in particular to camel thorn trees in the Khan River and its tributaries.~~ • ~~Each earth wire on both lines, if used, should have an air space safety gap wide enough to avoid being permanently active, but close enough to allow lightning strikes to bridge it.~~ • As far as possible, only existing tracks will be used for construction and maintenance. Where it is necessary to construct new service tracks, no blasting will be allowed. • Where it is at all possible, specific pylons will be approached from two sides rather than blasting a continuous track through granite. The latter refers specifically to a section of the permanent power line where it prematurely exits the old railway valley before cutting almost due east to the mining plant itself as well as a point northwest of the Khan River where the permanent power line crosses a small watershed in the rocky habitat. • Along the route, individuals or groups of species of conservation concern (e.g. *Commiphora saxicola, Aloe asperifolia, Hoodia* spp.) will be avoided as far as possible. Where this is not possible, those that are suited to relocation will be rescued with the appropriate permission from MET. • Damage to large riparian trees for any temporary structures will be avoided at all costs.
			Construction measures associated with the permanent 132 kV ~~220 kV~~ power supply infrastructure: • The following measures will be implemented to limit bird fatalities (in liaison with NamPower as the owner of the servitude and the powerline infrastructure): • The Khan River crossing should be perpendicular to the river, as far as possible, to maximise visibility and minimise the crossing distance; ~~it should also coincide with the crossing point of the temporary 66kV line, if possible.~~ • The eastern section of the Khan River valley, which has many trees, should

Activity/ Project Component	Potential impact	Management Objective	Management Measure
			be avoided. • Some form of illumination on the earth-optic wires is vital where the line crosses the Khan River valley and any other tributary. • Ideally, earth-optic wires along the entire length of the 132 kV ~~220 kV~~ power line (or at least across all potential bird paths) from the permanent substation to the Husab Mine substation should be fitted with spiral double loop flight diverters. • Where there is a need to place power line infrastructure on higher ground so that it protrudes above the valleys, the earth/optic should be fitted with some form of illumination as well as spiral double loop flight diverters across all potential bird paths.
			Decommissioning management measures for the temporary power supply infrastructure: • A rehabilitation plan will be developed that will contain clear objectives, a strategy, a work plan, a monitoring plan and management response guidelines. • Construction of all linear infrastructure types will result in disturbance of soil along the line of the route. Rehabilitation is therefore aimed at the repair of pre-existing topography • Natural water flows will be re-instated where required. • The area will be allowed to re-vegetate and monitored to ensure adequate cover is attained within two rainy seasons. • Plants rescued before construction will be reintroduced if possible
			Construction and operational management measures for the temporary and permanent power supply infrastructure: • Scout proposed routes for any signs of nesting/breeding, and avoid construction activities during breeding seasons. • Avoid the destruction of nesting habitat (large trees and bushes). • Limit linear infrastructure, activities and related disturbance to an absolute minimum.

Activity/ Project Component	Potential impact	Management Objective	Management Measure
			• Construction activities will start after sunrise and finish before sunset so that the disturbance at dusk and dawn for animal and bird movement is reduced. • Training will be provided to all workers about the sensitivity of biodiversity and the potential impacts to biodiversity and how these must be avoided, as well as "No-Go" zones (as per Figure 7-1) • To prevent high insect mortality, the use of light will be kept to a minimum, and where it is required, yellow lighting will be used where possible. Vertebrates will be kept away from the lighted areas with appropriate fencing where feasible. • There will be zero tolerance to the killing or collecting of any biodiversity (including the collection of wood). In this regard, the locations of species of concern will not be marked or advertised. Offenders will be prosecuted. • Sand collection from the Swakop and Khan Rivers for building purposes in the vicinity of linear infrastructure will ~~be minimised~~ not be tolerated. • Occupants of the temporary accommodation camps will be required to remain within the camp after working hours. • All camps will be supplied with sufficient cooking equipment so that the collection of fire wood is not required for this purpose. • Strict speed control measures are used for any vehicles driving within the NNNP and DNP boundaries. A special reduced speed limit (perhaps 60 km/hour) will be implemented for the permanent access road in the Khan River and associated tributaries where animal and bird concentration is highest. No off road driving will be allowed. • No off road driving will be allowed unless in emergencies. • No night driving will be permitted unless authorised by NNNP authorities or in emergency situations. • Noisy equipment will be well maintained to control noise emission levels. • Water reservoirs will be enclosed containers or netted in order to prevent access by birds and animals. • Pollution prevention measures will be implemented to prevent soil and water pollution. • Dust suppression will be conducted regularly and dust levels monitored during

Activity/ Project Component	Potential impact	Management Objective	Management Measure
			construction. • Regular dedicated monitoring patrols will be conducted along all power lines ~~once a month and once a week during the rainy season, i.e. late October to early December, and at the end of the rain season~~. • Outages will be recorded with the causes, position and other details. • Bird mortalities will be recorded on a standardized form, with the GPS/pole/tower number and other details, and photographs of the carcass, structure and general habitat. A copy of each report will be sent to the NamPower/NNF Strategic Partnership for further investigation.
As listed above in Table 7-41.	Water pollution	Pollution of surface water run-off and related health impacts on downstream users of surface and sub-surface (groundwater) water	As listed above in Table 7-41.
As listed above in Table 7-42.	Air pollution	Limit the mine's contribution to cumulative air pollution impacts	As listed above in Table 7-42.
As listed above in Table 7-41.	Noise pollution	Limit noise pollution impacts	As listed above in Table 7-41.
Construction: Limited blasting for widening valleys on the power line routes and for preparing substation foundations	Damage to third party infrastructure or injury to third parties or animals due to blasting	Prevent blast related damage and injuries to third parties, animals and infrastructure	As listed above in Table 7-41.

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Construction: Foundations Trenches Stockpiles Cranes Borrow pits Construction camps Temporary and permanent power lines Lights at substations Dust plumes **Operations:** Permanent power lines Permanent substation and associated lights **Decommissioning:** Trenches Piles of rubble Piles of scrap Contractor camps Dust plumes	Visual impact	Limit visual impacts on tourism and recreation activities	As listed above in Table 7-41.
Construction: Foundations Trenches Stockpiles Cranes Borrow pits Crushing and screening Equipment movement Generators	Negative socio-economic impacts on tourism and recreation	Limit the negative socio-economic impacts on tourism and recreation	As listed in Table 7-41

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Construction camps Temporary and permanent power lines Lights at substations Dust plumes Limited drilling and blasting **Operations:** Permanent power lines Permanent substation and associated lights **Decommissioning:** Trenches Piles of rubble Piles of scrap Contractor camps Dust plumes Vehicle and equipment movement			
As listed in Table 7-41.	Increase in traffic and related safety impacts	Reduce the potential for safety and vehicle related impacts on road users	As listed in Table 7-41.
As listed in Table 7-41.	Damage to archaeological sites	Prevent the unacceptable loss of archaeological sites and related historical information	As listed in Table 7-41.

Table 7-45A: Telecommunications Infrastructure Management Plan

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Construction: Trenches Borrow pits Scaffolding **Operation:** Elevated sections of the permanent water pipeline Reservoirs along water pipelines **Decommissioning:** Trenches Piles of rubble Piles of scrap	Injury to third parties or animals	Prevent physical harm to humans, animals and birds from hazardous excavations and infrastructure.	**Construction, operation and decommissioning**: ○ Barriers and warning signs will be used to keep people and animals away from the hazardous excavations and infrastructure. ○ Borrow pits, trenches and stockpiles will be cordoned off with appropriate safety barricade ~~danger tape~~ until they are closed. ○ Information will be provided at stakeholder information meetings to educate the public about the dangers associated with hazardous excavations and infrastructure. ○ If people or animals sustain injuries as a result of the linear infrastructure, the Husab emergency response procedure will be followed (refer to Appendix C).
As listed above in Table 7-41	Physical disturbance and of soil	Minimise the loss of soil resources and related functionality through physical disturbance, pollution, erosion and compaction.	As listed above in Table 7-41
As listed above in Table 7-41	Soil pollution		As listed above in Table 7-41
Construction: Soil stripping Cleaning, grubbing and bulldozing Preparation of foundations Material and equipment movement Compacting bases Opening borrow pits and trenches Vehicle movement	Physical destruction and general disturbance of biodiversity	Prevent, as far as is possible, the unacceptable loss of biodiversity and related functionality through physical destruction and general disturbance of fauna and flora.	**Construction and operations management measures:** • Limit linear infrastructure, activities and related disturbance to a minimum. • Construction areas will be clearly demarcated. • Construction activities will preferably start after sunrise and finish before sunset. • Monitoring and auditing of the performance of construction teams in the designated red flag areas will be conducted by Husab Environmental Section personnel on a weekly basis. Where the construction teams have not complied with the EMP the contractor will be held responsible ~~for making good~~. • Rehabilitation and restoration will be initiated in areas where construction has been completed as soon as possible. This will include follow up audits and

Activity/ Project Component	Potential impact	Management Objective	Management Measure
General construction activities Storage and handling of new and used materials and chemicals (including hydrocarbons) Waste management (non-mineralised) Servicing equipment Use of vehicles and equipment that may leak lubricants and fuel Security lights Contractors camps **Operations:** Vehicle movement Servicing equipment Soil stockpile management Servicing equipment Vehicle movement on access roads and off road Use of vehicles and equipment that may leak lubricants and fuel and that carry hazardous loads Security lights **Decommissioning:** Soil stripping Cleaning and grubbing Material and equipment movement Slope stabilization Vehicle movement			monitoring in the short and long term to determine the success of the rehabilitation and restoration. • Training will be provided to all workers about the sensitivity of biodiversity and the potential impacts to biodiversity and how these must be avoided, as well as "No-Go" zones (as per Figure 7-1). • To prevent high insect mortality, the use of light will be kept to a minimum, and where it is required, yellow lighting will be used. Vertebrates will be kept away from the lighted areas with appropriate fencing where feasible. • There will be zero tolerance to the killing or collecting of any biodiversity (including the collection of wood). In this regard, the locations of species of concern will not be marked or advertised. Offenders will be prosecuted. • Sand collection from the Swakop and Khan Rivers for building purposes in the vicinity of linear infrastructure will not be tolerated~~be minimised~~. • Occupants of the temporary accommodation camps will be required to remain within the camp after working hours. • All camps will be supplied with sufficient cooking equipment so that the collection of fire wood is not required for this purpose. • Strict speed control measures are used for any vehicles driving within the NNNP and DNP boundaries. A special reduced speed limit (perhaps 60 km/hour) will be implemented for the permanent access road in the Khan River and associated tributaries where animal and bird concentration is highest. No off road driving will be allowed. • No off road driving will be allowed unless in emergencies. • No night driving will be permitted unless authorised by NNNP authorities or in emergency situations. • Noisy equipment will be well maintained to control noise emission levels. • Water reservoirs will be enclosed containers or netted in order to prevent access by birds and animals. • Dust control measures are implemented. • Pollution prevention measures will be implemented to prevent soil and water

Activity/ Project Component	Potential impact	Management Objective	Management Measure
General demolition activities Storage and handling of new and used materials and chemicals (including hydrocarbons) Waste management (non-mineralised) Servicing equipment Use of vehicles and equipment that may leak lubricants and fuel Security lights Contractors camps **Closure:** Erosion of rehabilitated areas.			pollution. • Dust suppression will be conducted regularly and dust levels monitored. • All animal mortalities will be recorded on a standardized form, with the GPS and other details and photographs.
As listed above in Table 7-41.	Water pollution	Pollution of surface water run-off and related health impacts on downstream users of surface and sub-surface water (groundwater)	As listed above in Table 7-41.
As listed above in Table 7-42.	Air pollution	Limit the mine's contribution to cumulative air pollution impacts	As listed above in Table 7-42.
As listed above in Table 7-41.	Noise pollution	Limit noise pollution impacts	As listed above in Table 7-41.
Construction: Foundations	Visual impact	Limit visual impact	As listed above in Table 7-41.

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Trenches Stockpiles Cranes Borrow pits Construction camps Dust plumes **Operations:** Permanent telecommunication lines **Decommissioning:** Trenches Piles of rubble Piles of scrap Contractor camps Dust plumes			
Construction: Foundations Trenches Stockpiles Scaffolding Cranes Borrow pits Crushing and screening Equipment movement Generators Construction camps Lighting Dust plumes **Operations:** Permanent telecommunication lines	Negative socio-economic impacts on tourism and recreation	Limit the negative socio-economic impacts on tourism and recreation	As listed in Table 7-41

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Decommissioning: Trenches Piles of rubble Piles of scrap Contractor camps Dust plumes Vehicle and equipment movement			
As listed in Table 7-41.	Increase in traffic and related safety impacts	Reduce the potential for safety and vehicle related impacts on road users	As listed in Table 7-41.
As listed in Table 7-41.	Damage to archaeological sites	Prevent the unacceptable loss of archaeological sites and related historical information	As listed in Table 7-41.

Table 7-46B: Mobile communication antenna poles along the access road Management Plan

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Construction: Surveying and pegging Hole excavation Drilling Soil excavation Storage and handling of material Water utilization Operation and movement of	Injury to third parties or animals	Prevent physical harm to humans, animals and birds from hazardous excavations and infrastructure.	**Construction, operation and decommissioning**: ○ Barriers and warning signs will be used to keep people and animals away from the hazardous excavations and infrastructure. ○ Borrow pits, trenches and stockpiles will be cordoned off with appropriate safety barricade ~~danger tape~~ until they are closed. ○ Information will be provided at stakeholder information meetings to educate the public about the dangers associated with hazardous excavations and infrastructure. ○ If people or animals sustain injuries as a result of the linear infrastructure, the

Activity/ Project Component	Potential impact	Management Objective	Management Measure
construction vehicles Use of generators Painting, grinding and welding Provision of washing and mobile toilet facilities; Slope stabilization and erosion control. **Decommissioning:** Similar (relatively) to construction			Husab emergency response procedure will be followed (refer to Appendix C).
	Physical disturbance and pollution of soil	Minimise the loss of soil resources and related functionality through physical disturbance, erosion, compaction and pollution.	○ Limit the disturbance of soils to what is necessary in terms of site clearing and in terms of on-going maintenance (servicing equipment) and use of vehicles. ○ The design of the antenna-poles need to take surface water flow into consideration to ensure long term erosion protection measures are installed to prevent impacts to the foundations etc. of the proposed infrastructure.
	Soil pollution		○ Ensure that all hazardous material, wastes, etc. are transported and handled in a manner that they do not spill. ○ Hazardous substances must be handled, used and disposed of according to their MSDSs. ○ If spills do occur and soil is contaminated, remediate in situ using an appropriate bioremediation agent. ○ If in situ bioremediation is not possible, store contaminated soils and treat this waste as hazardous (final appropriate disposal). ○ Ensure that adequate stormwater measures area in place for the structures to ensure stability and to prevent erosion. ○ Major spillage incidents will be handled in accordance with the Husab emergency response procedure (refer to Appendix C).
	Physical destruction and general disturbance of biodiversity	Prevent, as far as is possible, the unacceptable loss of biodiversity and related functionality through physical destruction and general disturbance of fauna and flora.	**Construction, operation and decommissioning**: ○ Limit the size of development areas for the antenna-poles, including tracks to an absolute minimum; ○ Audit/inspect the activities of construction and maintenance teams; ○ Avoid removal of vegetation, especially sensitive species, i.e. *Commiphora saxicola/oblanceolata*, Aloes, *Lithops ruschiorum*, aloes, bushman candles, Hoedia, etc. and riparian and non-riparian trees especially *Acacia erioloba, Maerua schinzii*. Therefore, the final location of the poles and access roads should avoid these. Training will be provided to all workers about the impacts associated with biodiversity disturbances; ○ There is zero tolerance to the killing or collecting of any biodiversity (including the collection of wood). ○ No collection of sand for building and other purposes from the Khan River or surrounding area. No new borrow pits or areas of disturbance will be allowed. Material should therefore be obtained from existing (approved) facilities and

Activity/ Project Component	Potential impact	Management Objective	Management Measure
			expected for alien vegetation or seeds; o Contractors shall adhere to Swakop Uranium's speed control measures and submit a traffic management plan during installation. o No off road driving will be allowed; o Contractors shall adhere to Swakop Uranium's (relevant) waste management requirements stipulated in the EMP and internal procedures to ensure littering is prevented. o Demarcate construction area boundary and base. o Ensure that adequate stormwater measures area in place for the structures to ensure stability and to prevent erosion. o To prevent impacts on birds, preferably, no lights to be installed on top of the antenna poles. However, if lights need to be installed, adhere to the following requirements: ▪ Reduce numbers and intensity of lights at night to the minimum ▪ Use intermittent light, preferably strobe lights (i.e. avoid steady light in favour of flashing/blinking lights); if there is a choice of colour, white lights appear to have lower impacts than red ▪ Down-shield lighting for on-ground facilities and equipment to keep light within the boundaries of the site. ▪ Regular monitoring of bird collisions. Should the results indicate that bird collisions are still taking place, further mitigation should be investigated and applied.
	Water pollution and flow	Pollution of surface water run-off and impacts relating to surface water flow	o All hazardous substances and wastes will be handled and transported in a manner that they do not contaminate surface water run-off or near surface water flow. o Major spillage incidents that can contaminate water resources will be handled in accordance with the Husab Mine emergency response procedure (see Appendix C). o Ensure that adequate stormwater measures area in place for the structures to ensure stability and to prevent erosion. o The placement of the infrastructure must take into consideration the storm water flow patterns along the road servitude and not contribute to further damage to vegetation along the route (or the road embankment or road itself).

Activity/ Project Component	Potential impact	Management Objective	Management Measure
			○ Avoid placement of infrastructure in drainage lines (as far as possible) to ensure the infrastructure is protected from flash floods.
	Air pollution	Limit the mine's contribution to cumulative air pollution impacts	○ Vehicles and equipment will be maintained in good working order in order to minimise exhaust fumes. ○ Dust suppression techniques should be in place if excessive dust is generated during the construction phase. ○ If used, diesel generators will be operated and maintained according to supplier specifications.
	Visual impact	Limit visual impact	○ Use colours to reflect natural colours of the surrounding landscape. ○ The antenna poles should be positioned in such a way that it limits visual exposure along the Khan River. ○ Avoid littering. ○ Rehabilitation of areas will be done as soon as possible after the temporary and permanent infrastructure is no longer in use.
	Damage to archaeological sites	Prevent the unacceptable loss of archaeological sites and related historical information	○ Avoid the old communications stone pole supports along the access road. ○ Where any archaeological sites are found the Swakop Uranium Chance Find procedure will be implemented. Avoid the construction of the antenna poles on / near any such sites. ○ All workers (temporary and permanent) will be educated about the importance of preserving archaeological sites.

Table 7-47: Borrow Pit Management Plan

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Construction: Establishment of access tracks Establishment of borrow pits **Operation:** Operation of borrow pits **Decommissioning:** Borrow pit voids	Injury to third parties or animals	Prevent physical harm to humans, animals and birds from hazardous excavations and infrastructure.	**Construction, operation and decommissioning**: • Borrow pits will be cordoned off with appropriate safety barricade ~~danger tape~~ until they are closed and warning signs will be placed at each site. • Information will be provided at stakeholder information meetings to educate the public about the dangers associated with hazardous excavations. • Rehabilitate the borrow pits by filling the void with any unused material and sloping of the sides to 1:3. • If people or animals sustain injuries as a result of the borrow pits, the Husab

Activity/ Project Component	Potential impact	Management Objective	Management Measure
			emergency response procedure will be followed (refer to Appendix C).
Construction: Establishment of access tracks Establishment of borrow pits Soil stripping Vehicle movement **Operation:** Operation of borrow pits Vehicle movement Soil stockpile management **Decommissioning:** Borrow pit voids Erosion of final landform Soil stripping Cleaning and grubbing Material and equipment movement Slope stabilization Vehicle movement	Physical disturbance and of soil	Minimise the loss of soil resources and related functionality through physical disturbance, erosion and compaction.	**Construction and operations:** • Limit the disturbance of soils to what is absolutely necessary. • Stockpiling areas will be identified as far as practically possible in close proximity to the source of the soil. • Soil stockpiles will be demarcated, and clearly marked to identify both the soil type and the intended area of rehabilitation. • Options for preventing erosion of stockpiles could include recreating the crusty layer, rock cladding/mulches/berms or establishment of vegetation ~~such as the Vetivier grass~~. • Soil stockpiles heights for linear infrastructure will be restricted to a maximum of 2 m. The stockpile sides should as far as practically possible be stabilised as a slope of 1 in 6 or less. • No waste material will be placed on the soil stockpiles. • Equipment movement on top of the soil stockpiles will be limited as far as possible. • Undertake regular monitoring of soils (stockpiles, in its natural state and rehabilitated areas) to ensure effective implementation of measures. • Handle soils in dry weather conditions as far as possible to cause as little compaction as possible. • The soil stripping depth will be a minimum of 300 mm. • Utilizable soil (topsoil and upper portion of subsoil B2/1 Horizon), the lower “B” horizon (subsoil) and all softs (decomposed rock - soft overburden) must be handled and stockpiled separately, where feasible. • The utilizable soil will be stripped and stockpiled together with any vegetation cover present. • Where possible, consider sequential restoration so that fresh topsoil is used to rehabilitate areas thereby limiting the need to create stockpiles for lengthy periods of time.

Activity/ Project Component	Potential impact	Management Objective	Management Measure
			Decommissioning: • Stockpiled soil will be used to rehabilitate disturbed sites. Either ongoing as disturbed areas become available for rehabilitation and/or at closure. The utilizable soil removed during the construction phase shall be redistributed to achieve an approximate uniform stable thickness consistent that is free draining and consistent with the approved final land use (low intensity wildlife grazing). A minimum layer of 300 mm of soil will be replaced. • A representative sampling of the stripped soils stored for longer than 6 months will be analysed to determine the nutrient status of the utilizable materials. As a minimum the following elements will be tested for: EC, CEC, pH, Ca, Mg, K, Na, P, Zn, Clay % and Organic Carbon. These elements provide the basis for determining the fertility of soil. Based on the analysis, fertilisers will be applied if necessary. • Erosion control measures will be implemented to ensure that the soil is not washed away and that erosion gulleys do not develop prior to vegetation establishment.
Construction: Cement mixing Management of dirty water Waste management (non-mineralised) Equipment servicing Use of vehicles and equipment that may leak lubricants and fuel **Operation:** Operation of borrow pits Vehicle movement Servicing equipment Waste management (mineralised and non-	Soil pollution	Prevent pollution of soils.	**Construction, operation and decommissioning:** • Ensure that all hazardous chemicals (new and used), dirty water, wastes are transported and handled in a manner that they do not spill. In this respect all containers must be intact and leak proof and stored substances must be placed in bunded areas. • Hazardous substances must be handled, used and disposed of according to their MSDSs at the relevant camps and not at borrow pit sites. • If spills do occur and soil is contaminated, remediate in situ using an appropriate bioremediation agent • If in situ bioremediation is not possible, store contaminated soils and treat this waste as hazardous (final appropriate disposal). • Major spillage incidents will be handled in accordance with the Husab emergency response procedure (refer to Appendix C).

Activity/ Project Component	Potential impact	Management Objective	Management Measure
mineralised) **Decommissioning:** Borrow pit voids Management of dirty water Waste management (mineralised and non-mineralised) Equipment servicing Use of vehicles and equipment that may leak lubricants and fuel			
Construction: Establishment of access tracks Establishment of borrow pits Soil stripping Vehicle movement **Operation:** Operation of borrow pits Vehicle movement Soil stockpile management **Decommissioning:** Borrow pit voids Erosion of final landform Soil stripping Cleaning and grubbing Material and equipment movement Slope stabilization Vehicle movement	Physical destruction and general disturbance of biodiversity	Prevent, as far as is possible, the unacceptable loss of biodiversity and related functionality through physical destruction and general disturbance of fauna and flora.	**Construction, operations:** • Limit the area of disturbance to what is absolutely necessary • Scout the area with the assistance of a biodiversity specialist and identify any protected or sensitive species for relocation and carry out the relocation operation. • If large trees are encountered, the area left undisturbed around the base of the tree must be wider than the aerial circumference of the tree. • Borrow pit crews will be provided with information on no-go areas (as per Figure 7-1) **Decommissioning:** • Any material that is unsuitable for construction uses will be placed back into the void appropriately. Care will be taken not to place fine material on the slopes where this material will be vulnerable to erosion. Fines will be stabilised with coarser material in the void basin where appropriate in order to prevent dust generation. • Rehabilitate the borrow pits by sloping the sides to an angle of 1:3 and allow to re-vegetate. • Scour or scarify the surface of access tracks and allow to re-vegetate

Activity/ Project Component	Potential impact	Management Objective	Management Measure
			• Monitor re-vegetation and ensure that adequate cover is attained. within two rainy seasons. If this is not achieved, the assistance of a biodiversity specialist will be obtained to ensure re-vegetation.
Construction: Cement mixing Management of dirty water Waste management (non-mineralised) Equipment servicing Use of vehicles and equipment that may leak lubricants and fuel **Operations:** Servicing equipment Waste management (mineralised and non-mineralised) **Decommissioning:** Management of dirty water Waste management (mineralised and non-mineralised) Use of vehicles and equipment that may leak lubricants and fuel	Water pollution	Pollution of surface water run-off and related health impacts on downstream users of surface and sub-surface (groundwater) water	**Construction, operation and decommissioning:** • All hazardous chemicals (new and used), dirty water, non-mineralised wastes, and product are handled and transported in a manner that they do not contaminate surface water run-off or near surface water flow. Refer to the relevant surface, groundwater and soil management plans in preceding sections of this report (sections 7.5, 7.6) Vehicles and equipment will be refuelled and serviced at the camps and not at the borrow pit sites. • Potentially polluting substances will be stored at the camps/laydown areas and not at the borrow pit sites. • Portable toilets will be provided at the borrow pits sites and will be serviced regularly. • Potable water will be provided and no water will be abstracted from rivers. • Water use for dust suppression will be minimised. • If aggregate washing will be conducted on site, the water will be allowed to settle out and tested to determine if this water can be discharged. If the quality of this water is unsuitable for discharge, it will be contained and disposed of with sewage effluent. • If cement is mixed at the borrow pit sites, this will not be done directly on the ground, but instead on impermeable material such as tarpaulins. All runoff water will be contained and disposed of with the sewage effluent. • Major spillage incidents that can contaminate water resources will be handled in accordance with the Husab emergency response procedure (refer to Appendix C).
Construction: Establishment of access tracks Establishment of borrow pits Soil stripping	Air pollution	Limit the mine's contribution to cumulative air pollution impacts	**Construction, operational and decommissioning:** • Dust suppression along access tracks, at borrow pit sites through chemical binding agents combined with vehicle speed controls to achieve 50 % control efficiency • Dust controls at the crushing and screening operation (for road building) by water

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Vehicle movement **Operation:** Operation of borrow pits Vehicle movement Soil stockpile management Crushing and screening **Decommissioning:** Borrow pit voids Erosion of final landform Soil stripping Cleaning and grubbing Material and equipment movement Slope stabilization Vehicle movement			sprays to achieve 50 % control efficiency • Vehicles and equipment will be maintained in good working order in order to minimise exhaust fumes. • Any material that is unsuitable for construction uses will be placed back into the void appropriately. Care will be taken not to place fine material on the slopes where this material will be vulnerable to erosion. Fines will be stabilised with coarser material in the void basin where appropriate in order to prevent dust generation. • As part of closure planning the rehabilitation designs will incorporate measures to address long term pollution prevention and confirmatory monitoring.
Construction: Vehicle movement Earth moving equipment Crushing and screening **Operations:** Vehicle movement **Decommissioning:** Vehicle movement Earth moving equipment Slope stabilization	Noise pollution	Limit noise pollution impacts	**Construction, operations and decommissioning:** • All registered complaints will be documented, investigated and efforts made to address the area of concern where possible. • Vehicles and equipment will be maintained in good working order in order to minimise noise. • Activities and traffic will primarily be limited to the daylight hours between sunrise and sunset.
Operation: Limited blasting	Damage to third party infrastructure or injury to third parties or animals	Prevent blast related damage and injuries to third parties, animals and infrastructure	**Operation:** • The blast design, implementation and monitoring will, as a general rule, ensure that: o Fly rock is contained within 500 m of the blast site. o Ground vibration at the closest third party structures is less than 12 mm/s peak particle velocity.

Activity/ Project Component	Potential impact	Management Objective	Management Measure
	due to blasting		○ Air blast at the closest third party structures is less than 130 dB. • Prior to each blast the area within a 1 km radius of the blast site will be cleared of third parties. Prior to each blast an audible warning will be sounded. • All registered complaints will be documented, investigated and efforts made to address the area of concern where possible. • If a person or animal is injured by fly rock this must be handled in accordance with the Husab emergency response procedure (refer to Appendix C).
Construction: Establishment of borrow pits Dust plumes **Operations:** Borrow pit operation **Decommissioning:** Borrow pit void Dust plumes	Visual impact	Limit visual impacts on tourism and recreation activities	**Construction, operation and decommissioning:** • Land disturbance will be limited to what is absolutely necessary. • Rehabilitation of areas will be done as soon as possible after a borrow pit is no longer in use. • All dust plume sources will be managed to limit visual intrusion by dust. • No littering will be permitted.
Construction: Establishment of borrow pits Crushing and screening Dust plumes **Operations:** Borrow pit operation Limited blasting **Decommissioning:** Borrow pit void Dust plumes	Negative socio-economic impacts on tourism and recreation	Limit the negative socio-economic impacts on tourism and recreation	**Construction, operation and decommissioning:** • Swakop Uranium will continue to meaningfully engage with relevant people and entities in the tourism, conservation and recreation sector for the overall mining project to ensure that potential negative impacts from mining are managed in a way that the related impacts on tourism are acceptable. • Blasting impacts will be managed as described above. • Dust will be managed as described above.
Construction: Construction traffic **Operations:**	Increase in traffic and related safety	Reduce the potential for safety and vehicle related	**Construction, operations and decommissioning:** • A strict speed limit of 40 km/hr will be enforced along access tracks. • Road accidents are considered emergencies and will be handled in accordance

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Operation traffic **Decommissioning:** Rehabilitation traffic	impacts	impacts on road users	with the Husab emergency response procedure (refer to Appendix C). • Ensure basic road safety behaviour for all Husab employees through training and awareness. In addition, contracts between Husab Mine and contractors will ensure that the contractors conform to the same behaviour as employees. Typical issues include: o Keeping to safe speed limits, but as a minimum all specified road speeds will be adhered to. o Ensuring that drivers all have valid licenses. o Making sure that all vehicles are roadworthy. o Zero tolerance for drinking and driving. o Using lights appropriately for night driving.
Construction: Soil stripping Cleaning, grubbing and bulldozing Preparation of foundations Material and equipment movement Opening borrow pits and trenches Limited blasting **Operation:** Operation of borrow pit **Decommissioning:** Slope stabilization	Damage to archaeological sites	Prevent the unacceptable loss of archaeological sites and related historical information	**Planning, construction, operation:** • An archaeological specialist will be included in the final site selection for all borrow pits. In so doing, landscapes and finds of archaeological importance can be avoided in most cases. • Where any archaeological sites will be disturbed and/or destroyed they will be subjected to detailed survey. This information will be used to apply for the necessary permits that are required in terms of the National Heritage Act 2004. • All workers (temporary and permanent) will be educated about the importance of preserving archaeological sites. • If there are any chance finds of archaeological sites that have not been identified and described in the specialist report, Swakop Uranium will follow its 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.

Table 7-48: Helipad Management Plan

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Construction: Trenches Scaffolding **Operation:** Operation of helipad **Decommissioning:** Rehabilitation activities	Injury to third parties or animals	Prevent physical harm to humans, animals and birds from hazardous excavations and infrastructure.	**Construction, operation and decommissioning**: • The helipad area will be cordoned off with appropriate safety barricade ~~danger tape~~ during construction. • Information will be provided at stakeholder information meetings to educate the public about the dangers associated with hazardous excavations and the helipad site. • The helipad will be properly authorised through the Civil Aviation Directorate. • A Helipad Operations Manual will be developed and will include details of: o The helipad facility and of the flightpaths o Normal operating procedures. o Security. o Emergency procedures. o Staff training programs. o Maintenance practices. • A safety plan will be developed to ensure safety of people and animals at take-off and landings. A Helipad Manager will be appointed to implement this and the operations manual. • If people or animals sustain injuries as a result of hazardous excavations, the Husab emergency response procedure will be followed (refer to Appendix C).
Construction: Soil stripping Vehicle movement **Operation:** Operation of helipad Stockpile management **Decommissioning:** Soil stripping Cleaning and grubbing Slope stabilization Vehicle movement	Physical disturbance and of soil	Minimise the loss of soil resources and related functionality through physical disturbance, erosion and compaction.	As listed in Table 7-45.

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Construction: Cement mixing Management of dirty water Waste management (non-mineralised) Equipment servicing Use of vehicles and equipment that may leak lubricants and fuel **Operation:** Vehicle movement Servicing equipment Waste management (mineralised and non-mineralised) **Decommissioning:** Management of dirty water Waste management (mineralised and non-mineralised) Equipment servicing Use of vehicles and equipment that may leak lubricants and fuel	Soil pollution	Prevent pollution of soils.	As listed in Table 7-45
Construction: Soil stripping Vehicle movement **Operation:** Vehicle movement Soil stockpile management **Decommissioning:** Soil stripping Cleaning and grubbing	Physical destruction and general disturbance of biodiversity	Prevent, as far as is possible, the unacceptable loss of biodiversity and related functionality through physical destruction and general	**Construction, operations:** • Limit the area of disturbance to what is absolutely necessary • Scout the area with the assistance of a biodiversity specialist and identify any protected or sensitive species for relocation and carry out the relocation operation. • Crews will be provided with information on no-go areas (as per Figure 7-1). • The following measures will be implemented to prevent or reduce bird strikes: o If birds are observed on the aerodrome prior to take-off, these must be

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Material and equipment movement Slope stabilization Vehicle movement		disturbance of fauna and flora.	dispersed before take- off. o Ground personnel will try to scare away the birds using frightening devices, for example sounds, lights, pyrotechnics, radio-controlled airplanes, decoy animals, lasers, ~~dogs~~ etc. o Landing lights will be used by all helicopters during take-off, climb, descent, approach and landing. Although there is no conclusive evidence that birds see and avoid aircraft lights, their use will make the aircraft more visible. o All bird strikes will be reported to the appropriate authority. **Decommissioning:** • Rehabilitate the helipad area by removing the surface infrastructure and allow to re-vegetate. • Monitor re-vegetation and ensure that adequate cover is attained. within two rainy seasons. If this is not achieved, the assistance of a biodiversity specialist will be obtained to ensure re-vegetation.
Construction: Cement mixing Management of dirty water Waste management (non-mineralised) Equipment servicing Use of vehicles and equipment that may leak lubricants and fuel **Operations:** Servicing equipment Waste management (mineralised and non-mineralised) **Decommissioning:** Management of dirty water	Water pollution	Pollution of surface water run-off and related health impacts on downstream users of surface and sub-surface (groundwater) water	**Construction, operation and decommissioning:** • All hazardous chemicals (new and used), dirty water, non-mineralised wastes are handled and transported in a manner that they do not contaminate surface water run-off or near surface water flow. Refer to the relevant surface, groundwater and soil management plans in preceding sections of this report (Sections 7.5 and 7.6). • Vehicles and equipment will be refuelled and serviced at the laydown areas and not at the helipad site. • Potentially polluting substances will be stored at the laydown areas and not at the helipad site. • Portable toilets will be provided at the helipad site during construction and will be serviced regularly. • Potable water will be provided and no water will be abstracted from rivers during construction. • Water use for dust suppression will be minimised. • The helipad must be kept dry and runoff allowed to drain off the site.

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Waste management (mineralised and non-mineralised) Use of vehicles and equipment that may leak lubricants and fuel			• If cement is mixed at the helipad site, this will not be done directly on the ground, but instead on impermeable material such as tarpaulins. All runoff water will be contained and disposed of with the sewage effluent. • Any fuel will be stored in a designated and properly bunded area with the appropriate safety precautions. • Major spillage incidents that can contaminate water resources will be handled in accordance with the Husab emergency response procedure (refer to Appendix C).
Construction: Soil stripping Vehicle movement **Operation:** Soil stockpile management **Decommissioning:** Soil stripping Cleaning and grubbing Vehicle movement	Air pollution	Limit the mine's contribution to cumulative air pollution impacts	**Construction, operational and decommissioning:** • Dust suppression at the helipad site during construction to achieve 50 % control efficiency • Vehicles and equipment will be maintained in good working order in order to minimise exhaust fumes.
Construction: Vehicle movement Earth moving equipment Crushing and screening **Operations:** Vehicle movement **Decommissioning:** Vehicle movement Earth moving equipment Slope stabilization	Noise pollution	Limit noise pollution impacts	**Construction, operations and decommissioning:** • All registered complaints will be documented, investigated and efforts made to address the area of concern where possible. • Vehicles and equipment will be maintained in good working order in order to minimise noise. • Activities and traffic will primarily be limited to the daylight hours between sunrise and sunset.
Construction: Dust plumes **Operations:** Helipad operation **Decommissioning:**	Visual impact	Limit visual impacts on tourism and recreation activities	**Construction, operation and decommissioning:** • Land disturbance will be limited to what is absolutely necessary. • Rehabilitation of areas will ensure that the site becomes properly re-vegetated. • All dust plume sources will be managed to limit visual intrusion by dust. • No littering will be permitted.

Activity/ Project Component	Potential impact	Management Objective	Management Measure
Dust plumes			
Construction: Dust plumes **Operations:** Helipad operation **Decommissioning:** Borrow pit void	Negative socio-economic impacts on tourism and recreation	Limit the negative socio-economic impacts on tourism and recreation	**Construction, operation and decommissioning:** • Swakop Uranium will continue to meaningfully engage with relevant people and entities in the tourism, conservation and recreation sector for the overall mining project to ensure that potential negative impacts from mining are managed in a way that the related impacts on tourism are acceptable. • Dust will be managed as described above.
Construction: Soil stripping Cleaning, grubbing and bulldozing Preparation of foundations Material and equipment movement **Operation:** Operation of helipad **Decommissioning:** Slope stabilization	Damage to archaeological sites	Prevent the unacceptable loss of archaeological sites and related historical information	**Planning, construction, operation:** • An archaeological specialist will be included in the final detailed planning process for the helipad. • Where any archaeological sites will be disturbed and/or destroyed they will be subjected to detailed survey. This information will be used to apply for the necessary permits that are required in terms of the National Heritage Act 2004. • All workers (temporary and permanent) will be educated about the importance of preserving archaeological sites. • If there are any chance finds of archaeological sites that have not been identified and described in the specialist report, Swakop Uranium will follow its 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.

8. RESPONSIBLE PARTIES FOR EMP IMPLEMENTATION

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

8.1 General Manager

The Swakop Uranium CEO and the Chief Operating Officer (COO) have overall responsibility for environmental management on the mine and for ensuring that this EMP is implemented. To assist the CEO and COO, Swakop Uranium will have an Environmental ~~Department~~ Section that will be dedicated to managing and monitoring the environmental issues associated with the mine's activities.

8.2 Environmental ~~Department~~ Section

~~The Swakop Uranium Environmental Department is planned to be made up of at least an Environmental Manager, Environmental Specialist, Environmental Coordinator and two or more Environmental Technician/s. This Department will be responsible for assisting the CEO and COO and various other managers in all environmental and community issues, and specifically to ensure that the commitments as set out in this EMP are implemented during the design, operations, decommissioning and closure phases.~~

The Swakop Uranium Environmental Section is planned to be made up of at least an Environmental Superintendent, 2x Environmental Senior Officers, an Environmental Compliance Officer, an Environmental Monitoring Assistant and three (3) Environmental Field Assistants. This Section reports directly to the SQE Head of Department. This Section will be responsible for assisting the CEO and COO and various other managers in all environmental and community issues, and specifically to ensure that the commitments as set out in this EMP are implemented during the design, operations, decommissioning and closure phases.

In addition to the above, the Environmental ~~Department~~ Section is responsible for ensuring that all persons involved with Husab Mine Project comply with this EMP. As outlined in Section 2.2, each contractor will be required to develop their own Mini EMP based on this EMP ~~and the Contractor's EMP~~, any other relevant Husab Project requirements and specifications, and any permits or authorisations issued to Husab Project. These contractor Mini EMPs will focus on the specific aspects of the contractors work requirements and work areas.

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

- Regular inspections and auditing compliance to this 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 section 9 as well as any additional monitoring required by permit and authorisations issued to Swakop Uranium by relevant authorities.
- Ensure compliance to this EMP and permits and authorisations issued to Swakop Uranium by relevant authorities.

- 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 Swakop Uranium Management and various external stakeholders such as authorities and interested and affected parties on environmental management (where required).

8.3 Contractors

The Contractor Managers will be contractually required to comply with the various commitments in this overarching EMP ~~Contractor's EMP~~. As indicated above, the contractors will also be required to develop their own Mini EMP related to their specific work requirements and work areas based on the EMP, any other relevant Husab Project minimum requirements, specifications, authorisations and/or permits.

The Mini EMP~~s~~ contained in the returned tender documents will be adjudicated by the ~~EPCM contractor and/or~~ project Owner's Team, Supply Chain/Projects Contracts Section & the Environmental Section. This adjudication will be against aspects such as the equipment to be used, waste to be generated, provision of MSDSs etc. An adjudication checklist will be developed for this purpose.

The Environmental Section, as well as the ~~EPCM Environmental Manager~~Project Owners Support team, will conduct daily 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 ~~quarterly~~ regular basis in order to determine compliance with the relevant EMPs. In the event of non-conformances, the contractor will be required to take corrective action according to the requirements of the Environmental Section. Clean up may be done on their behalf, and if so, the contractor will be back-charged accordingly. Final payment certificates can be withheld by the Environmental Section, project Owner's Team, Supply Chain/Projects Contracts Section until the Environmental Team members are satisfied with the rehabilitation of the contractor's sites.

~~Two of these~~These formal audits will form the basis of the information be provided in the Bi-Annual report to the relevant authorities.

8.4 External specialists

Swakop Uranium 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 will also assess compliance against the EMP on an annual basis.

9. MONITORING PLAN

9.1 Introduction

The various management plans have covered various aspects of monitoring. This section both augments those requirements and sets further detail where relevant.

As a general approach, the monitoring programmes will comprise the following:

- A formal procedure.
- Appropriately calibrated equipment – regular inspections and calibration of equipment will be undertaken in line with the equipment calibration/validation procedure or manufactures/suppliers specifications.
- Where samples require analysis, they will be preserved according to laboratory specifications.
- Where practical, an accredited, commercial laboratory will undertake sample analyses.
- Parameters to be monitored can be identified in consultation with a specialist in the field and/or the relevant authority.
- If necessary, following the initial monitoring results, certain parameters may be removed from the monitoring programme in consultation with a specialist and/or the relevant authority.
- Monitoring data will be stored in a structured database.
- Data will be interpreted and reports on trends in the data will be compiled on a Bi-annual ~~quarterly~~ basis.
- Both the data and the reports will be kept on record for the life of mine.

As a general comment, if monitoring points become damaged or redundant then they can be replaced with new points.

9.2 Water Monitoring

The relevant surface and groundwater monitoring points, frequency and parameters for monitoring are provided in Table 9-1 and Table 9-2 below. The relevant monitoring points are shown in Figure 9-1. The monitoring parameters may be modified on the basis of input from an appropriate specialist and/or relevant authority. In addition to the above, the mine will record rainfall ~~and evaporation data~~ on a daily basis and evaporation as frequently as possible.

Additional monitoring boreholes (i.e. 2 deep boreholes intersecting the regional hard rock aquifer and 8 shallow boreholes in the alluvium) have to be drilled at the WRD perimeter where currently not existing.

Reporting will be undertaken at regular intervals (at least bi-annually) during operations or as required by relevant permits and authorisations issued to Husab Mine by relevant authorities.

Table 9-1A: Proposed Water Monitoring Points (Previously approved - 2013)

Monitoring point	Description	Quality	Water levels	comment
RS1	EPL Area	Quarterly	Quarterly	
RS2	EPL Area	Quarterly	Quarterly	

Monitoring point	Description	Quality	Water levels	comment
RS3	EPL Area	Quarterly	Quarterly	To be moved to another position
RS4	EPL Area	Quarterly	Quarterly	
RS 1	EPL Area	Quarterly	Quarterly	
RS 2	EPL Area	Quarterly	Quarterly	
RS 3	EPL Area	Quarterly	Quarterly	
RS 4	EPL Area	Quarterly	Quarterly	
RS 5	EPL Area	Quarterly	Quarterly	
RS 6	EPL Area	Quarterly	Quarterly	
RS 7	EPL Area	Quarterly	Quarterly	
~~RS 9~~	~~EPL Area~~	~~Quarterly~~	~~Quarterly~~	~~To be moved to another position~~
RS 10	EPL Area	Quarterly	Quarterly	
~~SW 1~~	~~Swakop River upper Ida Dome Compartment~~	~~Quarterly~~	~~Quarterly~~	
SW 2	Swakop River upper Ida Dome Compartment	Quarterly	Quarterly	
~~RSTBO2~~	~~EPL Area~~	~~Quarterly~~	~~Quarterly~~	~~To be moved to another position~~
WW202081	Khan River confluence compartment	Quarterly	Quarterly	
WW202082	Khan River Rossing Compartment	Quarterly	Quarterly	
WW202083	Khan River Rossing Compartment	Quarterly	Quarterly	
WW202085/ GWN04D	Outside EPL Area	Quarterly	Quarterly	
GWN07S	EPL Area	When possible	When possible	
~~GWNO4S~~	~~Outside EPL Area~~	~~When possible~~	~~When possible~~	
~~GWNO5D~~	~~EPL Area~~	~~When possible~~	~~When possible~~	
~~GWNO6S~~	~~EPL Area~~	~~When possible~~	~~When possible~~	
~~GWNO7D~~	~~EPL Area~~	~~When possible~~	~~When possible~~	
~~GWNO8~~	~~EPL Area~~	~~When possible~~	~~When possible~~	
~~New borehole~~	~~Banermann monitoring BH (Swakop River Lower Ida Dome Compartment)~~	~~Quarterly~~	~~Quarterly~~	~~Possibly take over monitoring role~~
~~New borehole~~	~~Rossing monitoring BH (Swakop RiverLower Ida Dome Compartment)~~	~~Quarterly~~	~~Quarterly~~	~~Possibly take over monitoring role~~
SW3 Replacement	Swakop River Lower Ida Dome Compartment	Quarterly	Quarterly	
~~BH1~~	~~Khan River confluence Compartment~~	~~Quarterly~~	~~Quarterly~~	
~~BH2~~	~~Drainage to the khan River~~	~~Quarterly~~	~~Quarterly~~	
~~BH3~~	~~Fault Structure in basement~~	~~Quarterly~~	~~Quarterly~~	
~~BH4~~	~~Fault Structure in basement~~	~~Quarterly~~	~~Quarterly~~	
~~BH5~~	~~Near plant facilities~~	~~Quarterly~~	~~Quarterly~~	
~~BH6~~	~~TSF towards Khan River~~	~~Quarterly~~	~~Quarterly~~	
~~BH7~~	~~TSF towards Khan River~~	~~Quarterly~~	~~Quarterly~~	
~~BH8~~	~~TSF area~~	~~Quarterly~~	~~Quarterly~~	
~~BH9~~	~~TSF area~~	~~Quarterly~~	~~Quarterly~~	
~~BH10~~	~~TSF area Marble~~	~~Quarterly~~	~~Quarterly~~	
~~BH11~~	~~TSF area drainage towards~~	~~Quarterly~~	~~Quarterly~~	

Monitoring point	Description	Quality	Water levels	comment
	~~Swakop River~~			

Table 9-1B: Updated compliance monitoring network (2017-2018). 35 groundwater monitoring boreholes in total: 15 Quarterly and 20 Biannually.

Monitoring point	Description	Quality	Water levels	Comment
RS1	North of Pit Zone 1	Quarterly	Quarterly	
RS2	West of Pit Zone 1	Quarterly	Quarterly	
RS3	Haul Road A and Plant Servitude Road	Quarterly	Quarterly	
RS4	South west of Pit Zone 2	Quarterly	Quarterly	
RS7	South of WRD	Quarterly	Quarterly	
RS10	North of Mine Perimeter Fence/Pit Zone 1	Quarterly	Quarterly	
SW 2	Swakop River upper Ida Dome Compartment	Quarterly	Quarterly	
GW-45 (WW204010)	Swakop River	Quarterly	Quarterly	SW3 replacement
GWN01 (WW202081)	Khan River confluence compartment	Quarterly	Quarterly	
GWN02 (WW202082)	Khan River Rossing Compartment	Quarterly	Quarterly	
GWN03 (WW202083)	Khan River Rossing Compartment	Quarterly	Quarterly	
GW-29 (WW204008)	Khan River	Quarterly	Quarterly	
GWN04D (WW202085)	North-North East of WRD	Quarterly	Quarterly	
GWN07S	EPL Area	Quarterly	Quarterly	
GW-11	Downstream TSF	Quarterly	Quarterly	
RS6	Downstream TSF	Biannually	Biannually	
GW-10	Downstream TSF	Biannually	Biannually	
GW-12	Downstream TSF	Biannually	Biannually	
GW-14	Upstream TSF	Biannually	Biannually	
GW-16	TSF East	Biannually	Biannually	
GW-17	Downstream TSF	Biannually	Biannually	
GW-20	Pit Area	Biannually	Biannually	
GW-21	Pit Area	Biannually	Biannually	
GW-23	Upstream TSF	Biannually	Biannually	
GW-26 (WW204007)	Paddaklip gorge	Biannually	Biannually	
GW-27 (WW204006)	Paddaklip gorge	Biannually	Biannually	
GW-28 (WW204009)	Khan River basement aquifer	Biannually	Biannually	
GW-30	Valley drain near STP	Biannually	Biannually	
GW-31	TSF monitoring hole	Biannually	Biannually	RS5 replacement
GW-32	Low grade ore stockpile /Pit dewatering	Biannually	Biannually	

Monitoring point	Description	Quality	Water levels	Comment
GW-37	East TSF channel	Biannually	Biannually	
GW-38	East TSF channel	Biannually	Biannually	
GW-39	Welwitschia Camp Site	Biannually	Biannually	
GW-41	WRD	Biannually	Biannually	
GW-51	Between TSF and Khan River	Biannually	Biannually	

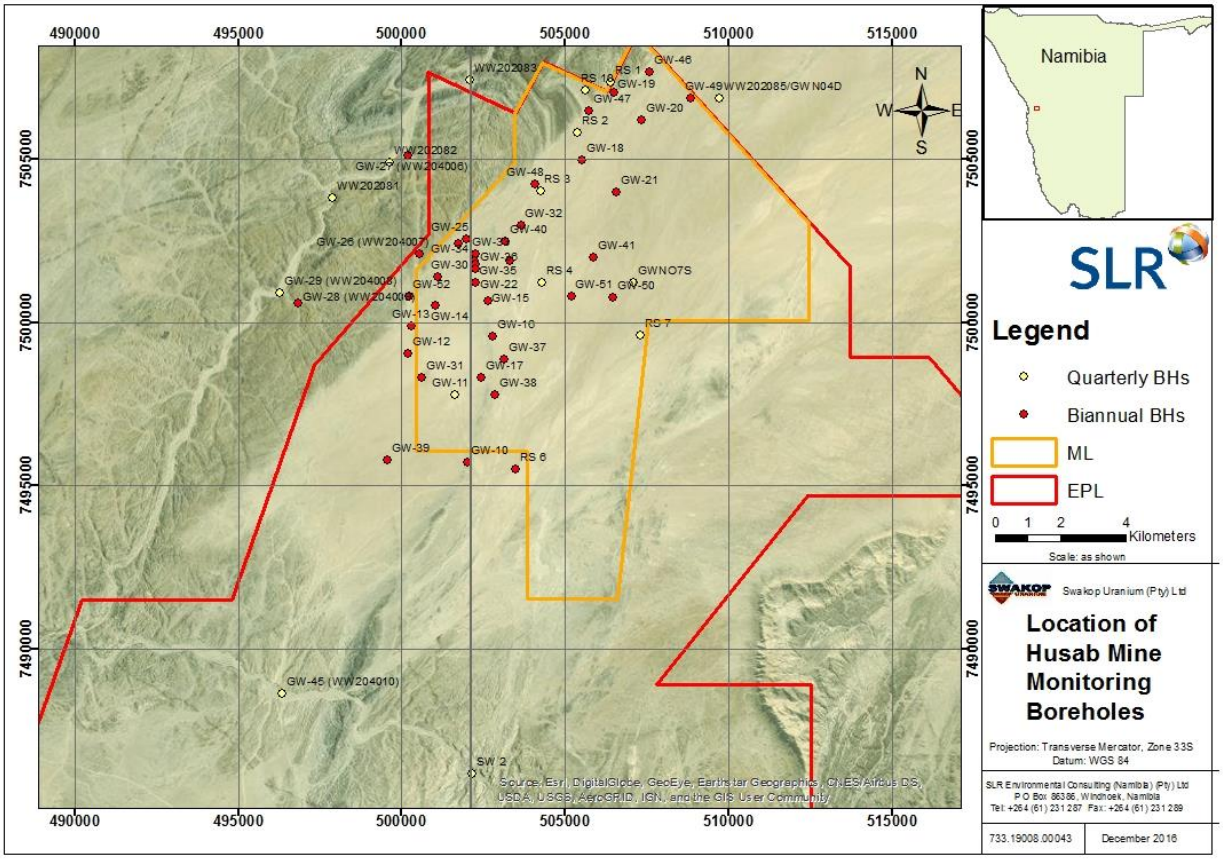

Figure 9-1a: Groundwater Monitoring plan

Table 9-2: Water Monitoring Parameters (modified once baseline is established)

MAJOR IONS	UNIT	TOTAL + DISSOLVED METALS	UNIT	RADIONUCLIDES (Subjected to change based on consultant recommendations and previous results)	UNIT
pH		Barium as Ba	µg/l	^{238}U Uranium	mBq/l
Electrical Conductivity	mS/m	Chromium as Cr	µg/l	^{234}U Uranium	mBq/l
Turbidity	NTU	Strontium as Sr	µg/l	^{230}Th Thorium	mBq/l
Total Dissolved Solids (calc.)	mg/l	Titanium as Ti	µg/l	^{226}Ra Radium	mBq/l
P-Alkalinity as CaCO3	mg/l	Vanadium as V	µg/l	^{210} Po Polonium	mBq/l
Total Alkalinity as CaCO3	mg/l	Zinc as Zn	µg/l	^{210} Pb Lead	mBq/l
Total Hardness as CaCO3	mg/l	Beryllium as Be	µg/l	^{235}U Uranium	mBq/l
Ca-Hardness as CaCO3	mg/l	Cadmium as Cd	µg/l	^{232}Th Thorium	mBq/l
Mg-Hardness as CaCO3	mg/l	Cobalt as Co	µg/l	^{228}Ra Radium	mBq/l
Chloride as Cl	mg/l	Copper as Cu	µg/l		
Fluoride as F	mg/l	Lead as Pb	µg/l		
Sulphate as SO_4	mg/l	Molybdenum as Mo	µg/l		
Nitrate as N	mg/l	Nickel as Ni	µg/l		
Nitrite as N	mg/l	Selenium as Se	µg/l		
Sodium as Na	mg/l	Uranium as U	µg/l		
Potassium as K	mg/l	Arsenic as As	µg/l		
Magnesium as Mg	mg/l	Bismuth Bi	µg/l		
Calcium as Ca	mg/l	Mercury Hg	µg/l		
Free and saline ammonium	mg/l	Tin as Sn	µg/l		
Stability pH, at 25°C		Tellerium as Te	µg/l		
Langelier Index		Iron as Fe	µg/l		
Ryznar Index		Manganese as Mn	µg/l		
Corrosivity ratio		Antimony as Sb	µg/l		
		Aluminium as Al	µg/l		
		Boron as B	µg/l		
		Lithium as Li	µg/l		

Monitoring gauges, measuring the flood volume and (temporary) groundwater levels in the alluvial channel, should be installed upstream and downstream of the diversion channel (east of the WRD) to quantify transmission losses and assess the necessity for further mitigation measures.

9.3 Air Monitoring

The current dust fallout (TSP) network will be expanded to measure both impacts on sensitive receptor sites as well as ecologically sensitive areas. The dust buckets will be placed immediately downwind of activities and at key areas around the mine site. The conceptual layout of monitoring points is shown on Figure 9.1. However, more dust buckets should be deployed (in consultation with an air quality specialist) at increasing distances around the periphery of the WRD, with particular emphasis on areas to the SSE, S and SW of the WRD.

Monitoring will be undertaken using the American Society for Testing and Materials standard test method for the collection and analysis of dustfall (ASTM D-1739) or any other method which can demonstrated to give equivalent results (SANS, 2004). The results of the fall out dust monitoring will be monitored on a monthly ~~quarterly~~ basis.

The target on-site (immediately adjacent to mine activities) dust fallout reading should be 1 200 mg/m^2/day. The absence of a visible dust plume along haul roads, at all tipping points and outside the primary crusher would be the best indicator of effective control equipment in place.

The operation of an on-site calibrated meteorological station(s) will be continued.

It is essential that the emissions from the waste incinerator do not exceed the adopted emissions limit. It is therefore recommended that a stack emission measurement campaign be conducted once the proposed waste incinerator is fully operational. This is to confirm that the emissions fall within adopted emissions limit.

Reporting will be undertaken at regular intervals (at least bi-annually) during operations or as required by relevant permits and authorisations issued to Husab Mine by relevant authorities.

9.4 Biodiversity Monitoring

The biodiversity monitoring plan may include the following:

- Measure relevant aspects of indicator species as identified through the baseline studies.
- Monitor activity of key functional groups such as gerbils.
- Monitor population size and dynamics of the Husab Sand Lizard and gerbils.
- Monitor populations of threatened and endangered species.
- Monitor animal movement and foraging activities ~~feeding~~, population size and changes therein in the marble ridges and hard undulating plains.
- Monitor presence and population size of Rüppel's Korhaan, Ludwig's Bustard and presence and breeding of Lappet-faced Vulture.
- Monitor success of plant and animal rescue (where possible) and translocation projects using appropriate indicators that reflect on individual fitness and population dynamics.
- Based on the outcomes of preliminary dust fallout results, identify which plant populations need to be monitored. Monitor vigour of these plant populations over time
- Monitor movement of animals at strategic points throughout the life of mine.
- Monitor use of over- or underpasses by animals.
- Monitor effectiveness of restoration efforts as per rehabilitation plan.
- Implement a long term monitoring programme that is advised from the Welwitschia baseline study. As a minimum the monitoring should do the following:
  - Measure reproduction dynamics and monitor in sample populations both within and outside mine area.
  - Monitor population size and dynamics using appropriate and tested techniques.
  - Monitor plant health and vigour, using appropriate tools and techniques, especially where upstream flows of water are either blocked or re-routed.
- Monitor the health and vigour of riparian vegetation and trees.
- Population size and density of selected indigenous trees as well as of Prosopis sp. in the affected river compartments.
- Indicator of physiological integrity, of selected trees (e.g. xylem pressure potential)

- Water table depth, recharge rates, lateral and vertical flow rates.
- Monitor use of drainage lines, especially Rocky Valley Drainages, by animals.
- Monitor health of plant populations inside and adjacent to drainage lines and especially downslope of points of impact.
- Monitor movements of zebra and changes in spatial organisation as a result of the TSF, Permanent Water Pipeline, Permanent Access Road, WRD and Mine Perimeter fence.
- Monitor presence of mammals on and at the TSF using both direct observations at regular intervals and estimates based on indirect evidence such as spoor counts.
- Monitor the presence of birds, especially water birds, on the TSF through direct observation at regular periods. This can be done intensively in the first year of nameplate operations and thereafter the intensity can be decreased, dependent on data from the first intensive period.
- Keep a lookout for, and record, mortalities or evidence of morbidity in animals. Send samples of animals suspected to have died from toxicity for analysis by a qualified toxicology laboratory, where possible.
- Monitor area adjacent to construction sites for discarded waste and human waste.
- Monitor handling of hydrocarbons and any other hazardous wastes in light of appropriate and relevant principles.
- Measure species composition, diversity and vigour of plants in area around TSF and downstream before, during and after impacts.
- Study and monitor the effects of dust and especially fine dust on photosynthesis and gas exchange of Welwitschia and other key plant species.
- Study and monitor the effects of fine dust and resulting encrustations of fine dust material around the bases of stones on BSC and cursorial invertebrates.
- Monitor water flow regime in the affected and unaffected drainage lines and compare and refine distribution plan accordingly.
- Monitor plant health, particularly *Welwitschia mirabilis* and *Petalidium pilosi-bracteolatum* (highly restricted endemic species) and refine water distribution plan accordingly.
- Monitor erosion and deposition along and beyond all channels and dams, and adjust infrastructure accordingly.
- Monitor siltation of storm-water collection dam and remove excess silt.
- Monitor blockages of all channels and clear as appropriate.
- Monitor the health and dust loads of plants downstream of the WRD and compare with unaffected plants. This will mean the addition of more plants to the current monitoring programme.

9.5 Radiological monitoring

Radiation monitoring will be outlined in the Radiation Management Plan as is required by law. The environmental monitoring will, as a minimum, include the following:

- Groundwater monitoring as discussed above. In this regard, the radionuclide analysis will be done on a basis sufficient to monitor potential pollution.
- As part of the dust and PM10 monitoring programme specified above, a radionuclide & metals analysis will be done periodically.
- Once-off confirmatory radon exhalation monitoring [emission concentration and rates (flux)] will be undertaken at major exposure sources such as the mineral waste facilities, mineralised stockpile and the open pits. This data will be used to verify the information used in the NECSA 2010 and 2013 assessments.

- Radon gas monitoring should be performed according to the recommendation of the radiation management plan. Although it is suggested by the Radiation specialist that radon gas monitoring be performed at the same respective locations where the dust fall-out samplers are deployed. Radon cups could be placed at all dust sampling sites as illustrated in Figure 9.1.
- Once-off confirmatory sampling of radioactive dust sources such as the mineral waste facilities, mineralised stockpile and the open pits will be analysed for a full suite of radio-nuclides. This data will be used to verify the information used in the NECSA 2010 and 2013 assessments. Also, soil samples (at close proximity to the air quality monitoring locations) will be taken for analysing the radionuclide components in the soil every two (2) years.
- Radiation-related public and environmental monitoring must be initiated prior to the commencement of operations of the proposed incinerator, to strengthen the baseline data of relevance to the atmospheric pathway.
- Update the RMP with monitoring requirements from the Radiation Impact Assessment of the proposed Waste Incinerator (Von Oertzen, 2018).

Reporting will be undertaken at regular intervals (at least bi-annually) during operations or as required by relevant permits and authorisations issued to Husab Mine by the relevant authorities.

9.6 Soil Management Monitoring

Regular inspections of soil stockpiles and rehabilitated areas will be undertaken to ensure that the Topsoil Management ~~conservation~~ procedure is being implemented.

9.7 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 the Husab Mine by the authorities:

- Slope stability, integrity of walls and liner in the tailings paddock, presence of seepage, capacity of dirty water system, and functioning of drains in the mineral waste facilities ~~mine residue facility~~.
- The volume of mineralised waste generated as well as the disposal area, height and footprint of mineralised waste disposal/storage facilities will be monitored and recorded as required. The results will be reported bi-annually.

9.8 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.

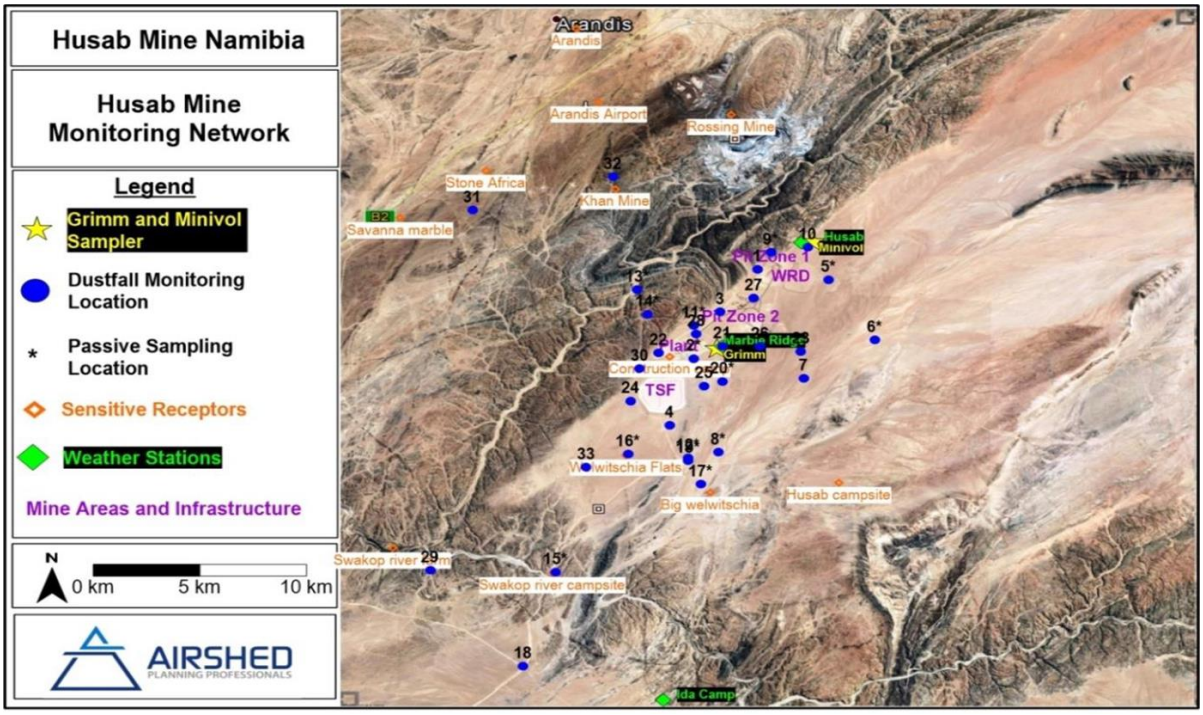

Figure 9-1b: Dust Monitoring Network

10. MONITORING AND AUDITING COMPLIANCE TO EMP

The commitments contained in this EMP will, once an environmental clearance has been obtained, be Swakop Uranium'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.

The EMP can be audited very easily by asking a simple question. *Has Swakop Uranium met the commitment?* Yes or no answers should provide sufficient information on the degree of Swakop Uranium's adherence to the EMP. A draft example of how this compliance check can be done is provided in Appendix D (EMP compliance checklist)

10.1 Audits and inspections

The Environmental ~~Manager~~ Superintendent, ~~Site Environmental Manager~~ Senior Environmental Officer and/or the Environmental ~~Specialists~~ Compliance Officer will conduct internal ~~management~~ audits against the commitments in the EMP. During the construction phase, construction audits will be conducted monthly. In the operational phase, these audits will be conducted on a quarterly basis. The audit findings will be documented for both record keeping purposes and for informing continual improvement.

In addition, an independent professional will conduct an EMP performance assessment at least once a year for the Bi-Annual Report. The mine's compliance with the provisions of the EMP and the adequacy of the EMP relative to the on-site activities will be assessed in this report.

The Environmental ~~Site Manager and Environmental Compliance Technicians~~ Section will conduct daily inspections during construction and weekly inspections during mining operations.

10.2 Submission of information

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

- The bi-annual report required by the MET will be submitted every six months.
- Other monitoring reports will be provided to the relevant authorities as per the permit and other agreements.

11. MINIMUM REQUIREMENTS

The table below provides the minimum requirements and regular maintenance for bunding, oil and fat traps, silt traps and wash bays. These requirements will be implemented throughout the life of mine.

Table 11-1: Requirements for Bunding, Oil and Fat Traps, Silt Traps and Wash Bays

Minimum Requirements	Regular Maintenance
Bunding	
• All bunded areas must have a capacity, 110 % of the capacity of product that will be stored in the bunded area. • Bund floors must be layered with an impermeable DPC liner of at least 1 000 micron thickness. • Bund walls must be double brick walls with the DPC liner folded between the two brick walls • Bund walls must be plastered to provide a watertight seal. Refractory cement can be used. • 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 manually removed. • No vehicles or machinery that can compromise the integrity of bundwalls may be used to clean out bunded areas. • Once all sand is removed from bunded areas, a hydrocarbon washing solution (e.g. Gator Fluid0 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.
Oil and fat 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 (refer to section below for minimum requirements and maintenance of silt traps). • The standard oil trap design and specifications as used by petrochemical companies must be employed. • Oil and fat traps must have at least three cells with the first cells outlet situated at the bottom of the cell and the second cell's outlet situated at the top of the cell. • The last cell of the oil trap has no outlet. • A dedicated oil trap pump must be provided for the cleaning of oil traps.	• Oil and Fat traps must be cleaned on a monthly basis or more frequently as the specific situation may dictate. • All free phase product from the first cell must be collected through the applying of hydrocarbon absorption material. • Once the absorption material is saturated, it must be skimmed off and collected in impermeable bags. • Water from the last cell often contain dissolved hydrocarbons and must also be collected through pumping in suitable containers ~~210 litre drums~~. • Both the saturated absorption material and water pumped from the last cell must be disposed of as per the hazardous waste disposal procedures.

Minimum Requirements	Regular Maintenance
Silt traps	
• Silt traps must be constructed down gradient from any activity which might possibly produce an effluent with suspended material • 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 width of the silt trap will be determined by the width of the machinery dedicated to the cleaning of silt from the traps. • The outlet of the silt trap must preferably be situated to the side of the trap and not at the end of the trap to ensure that sediments settle down within the silt trap. • All silt traps must be equipped with a grid at the outlet to ensure that larger floating objects also gets captured in the silt trap.	• Silt traps must be cleaned on a monthly basis and before the start of the rainy season. • All silt must be treated as hazardous waste and be disposed of as per the hazardous waste disposal procedure • Silt must be transported in covered containers. • Workers cleaning the silt trap must wear appropriate personal protective equipment (PPE).
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 will be used.	• All wash bay trenches must be cleaned manually on a weekly basis. • Silt and oil traps must be cleaned as described above.

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Appendix A: Details of the Persons Who Prepared this EMP

DETAILS OF THE PERSONS WHO PREPARED THIS EMP

Metago Environmental Engineers (Pty) Ltd (Metago), the independent firm of consultants undertook the EIA and compiled the EIA Report (Metago, 2010) that forms the basis of this EMP.

Michele Kilbourn Louw (Swakop Uranium, previous Environmental Manager), and Linda Munro (Metago) prepared this EMP.

Michele Kilbourn Louw has a BSc, B Com Hons and a Post Graduate Diploma in Science. She has worked as an environmental consultant and manager for the past 14 years on large scale mining and construction projects in both Namibia and South Africa.

Linda Munro holds a Masters Degree in Environmental Management from the South African Rand Afrikaans University and has over eight years of relevant experience and is registered as a candidate with the South African Council for Natural Scientific Professions (SACNSP) as a professional natural scientist (Environmental Management).

The EMP was updated in 2013 and again in 2018 by SLR Environmental Consulting (PTY) Ltd. Werner Petrick (2013 and 2018) and Brandon Stobart (2013) from SLR prepared the revised document.

Appendix B: ~~Health Safety Environment and Community Policy~~ Swakop Uranium Company Policy

Appendix C: Husab Emergency Response Plan

Appendix D: Example of Auditing Checklist

No	Commitment	Observations	C/A/I	Action recommended / to be taken	Who	When
P6	If further development is to occur, it will be covered in a separate EIA that will assess the cumulative impacts of current and proposed activities. The existing EMP document will then be revised to accommodate the management of impacts, both local and cumulative, of the new development.					
P7	Once the MET comments have been received, these requirements will be incorporated into the EMP that will then be given a specific revision number					
P6	Impacts and mitigation measures identified in the linear EIA will be incorporated into this Environmental Management Plan					
p7	~~Three additional focussed EMPs, that will contain detailed action plans, will be developed~~ All applicable information & action plans from part of this overarching EMP. Additional detailed procedures and work instructions will be developed.					
	~~An EMP to cover all operational activities will be produced during the construction phase, prior to the commissioning of the plant.~~					