Metago

Environmental Engineers (Pty) Ltd

ENVIRONMENTAL SCOPING REPORT FOR THE PROPOSED STAGE 4 EXPANSION PROJECT, THE CONVERSION OF EPL3500 TO A ML, A NEW (NAMWATER) WATER PIPELINE AND UPGRADING THE POWER SUPPLY (NAMPOWER) AT LANGER HEINRICH MINE

Prepared For

Langer Heinrich Uranium (Pty) Ltd

METAGO SLR PROJECT NUMBER: EL016-03

REPORT NO. 1

April 2011

ENVIRONMENTAL SCOPING REPORT FOR THE PROPOSED STAGE 4 EXPANSION PROJECT, THE CONVERSION OF EPL3500 TO A ML, A NEW (NAMWATER) WATER PIPELINE AND UPGRADING THE POWER SUPPLY (NAMPOWER) AT LANGER HEINRICH MINE

Prepared For

Langer Heinrich Uranium (Pty) Ltd

METAGO SLR PROJECT NUMBER: EL016-03

REPORT NO. 1

April 2011

DOCUMENT INFORMATION

Title	ENVIRONMENTAL SCOPING REPORT FOR THE PROPOSED STAGE 4 EXPANSION PROJECT (INCLUDING THE CONVERSION OF EPL3500 TO A ML), A NEW (NAMWATER) WATER PIPELINE AND UPGRADING THE POWER SUPPLY (NAMPOWER) AT LANGER HEINRICH MINE
Project Manager	C Herbert
Author	C Herbert
Reviewer	B Stobart
Client	Langer Heinrich Uranium (Pty) Ltd
Date last printed	
Date last saved	
Comments	
Keywords	
Project Number	EL016-03
Report Number	1
Status	Issue
Issue Date	March 2011
Document Identification Bar Code	

METAGO SLR

Physical Address:
Metago House
Fourways Manor Office Park
Corner Roos and Macbeth Streets
Fourways
Johannesburg
South Africa

Postal Address:
P O Box 1596
Cramerview
2060

Tel: +27 (011) 467-0945

Fax: +27 (011) 467-0978

E-mail: natasha,daly@metago.co.za or brandon@metago.co.za

Web: www.metago.co.za

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

ACRONYMS AND ABBREVIATIONS

A list of acronyms and abbreviations relevant to this report is included below.

Acronyms	Description
a	Annum
amsl	above mean sea level
dBA	Decibels
BID	Background Information Document
℃	Degree centigrade
CoM	Chamber of Mines
CTAN	Coastal Tourism Association of Namibia
dB	Decibels
DEA	Directorate of Environmental Affairs
DEM	Digital Elevation Model
DWAF	Department or Water Affairs and Forestry
EC	European Community
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
EPL	Exclusive Prospecting Licence
ERC	Erongo Regional Council
ESIA	Environmental and Social Impact Assessment
IAP	Interested and Affected Party
ICRP	International Commission on Radiological Protection
IEM	Integrated Environmental Management
IFC	International Finance Corporation
kV	Kilo Volt
ℓ	Litre
lb	pound (of weight)
LHM	Langer Heinrich Mine
LOM	Life of Mine
M	Mega, million, x 10^6
m	Metre
M	Million
m/s	metres per second
mamsl	Metres above mean sea level
MAP	Mean Annual Precipitation
MAR	Mean Annual Runoff
masl	metres above sea level
MAWF	Ministry Water Affairs and Forestry
MAWRD	Ministry of Agriculture Water and Rural Development (now MAWF)
MET	Ministry of Environment and Tourism
Metago	Metago SLR
MFMR	Ministry of Fisheries and Marine Resources
mg	Milligram
mg/ℓ	milligram/litre

Acronyms	Description
MHSS	Ministry of Health and Social Services
ML	Mining Licence
MLR	Ministry of Lands and Resettlement
mm	Millimetres
mm/a	millimetres per annum
Mm^3	million cubic metres
Mm^3/a	million cubic metres per annum
MME	Ministry of Mines and Energy
MMSD	Mining Minerals and Sustainable Development Project
MoHSS	Ministry of Health and Social Services
MRLGH	Ministry of Regional and Local Government and Housing
MTI	Ministry of Trade and Industry
MW	Mega Watt
MWTC	Ministry of Works Transport and Communications
NamPower	Namibia Power Corporation
NamWater	Namibia Water Corporation Ltd
NHA	National Heritage Act
NMCF	Namibian Mine Closure Framework
NNNP	Namib Naukluft National Park
Paladin	Paladin Energy Ltd
PM10	Particulate matter less than 10 microns in size
PPP	Public Participation Process
ROD	Record of Decision
RSA	Republic of South Africa
RTE	Rare, threatened or endangered
SAIEA	Southern African Institute for Environmental Assessment
SEA	Strategic Environmental Assessment
SEMP	Strategic Environmental Management Plan
TDS	Total Dissolved Solids
TOR	Terms of Reference
TSP	Total suspended particulates
TWQG	Target Water Quality Guidelines
U	chemical symbol for uranium
W	Watt
WHO	World Health Organization

ENVIRONMENTAL SCOPING REPORT FOR THE PROPOSED STAGE 4 EXPANSION PROJECT (INCLUDING THE CONVERSION OF EPL3500 TO A ML), A NEW (NAMWATER) WATER PIPELINE AND UPGRADING THE POWER SUPPLY (NAMPOWER) AT LANGER HEINRICH MINE

1. INTRODUCTION

1.1. INTRODUCTION TO THE PROPOSED PROJECTS

Langer Heinrich Uranium (Pty) Ltd, a wholly-owned subsidiary of Paladin Energy Ltd (Paladin), owns and operates the Langer Heinrich Mine (LHM) situated approximately 80kms east of Swakopmund in the Namib Naukluft National Park (NNNP). The mine operates under the approval of a mining licence (ML140), an environmental impact assessment (EIA) and an environmental management plan (EMP). Adjoining the western boundary of ML140 there is an exclusive prospecting licence area (EPL3500). The existing mine access road joins the C28 road to Swakopmund and the site has existing water pipeline and grid connections provided by NamWater and NamPower respectively.

The regional and local settings of the mine are shown in Figures 1-1 and 1-2 respectively.

LHM plans to increase uranium oxide production from 5.2 to 10 million pounds per annum (Mlbpa) and to convert EPL3500 in to a mining licence (ML) to enable the existing mine to extend into this area. The main components of the project include: the expansion of the existing processing plant (stage 4 expansion), the conversion of EPL3500 to a ML, an increase in the mine area and in the mining rate, and additional support infrastructure and services. The expansion project will also require additional water and power which will be provided by a new water pipeline and an upgraded power supply. The proposed expansion project, conversion of EPL3500 to a ML, water pipeline and power supply, whilst part of the same EIA process, are individual projects/components (under three separate proponents namely LHM, NamWater and NamPower) and will be subject to separate EIA and EMP reports. However in order to provide an overall picture of the proposed projects in relation to the Stage 4 developments during the consultation process they are all included in this scoping report.

1.2. PROJECT MOTIVATION (NEED AND DESIRABILITY)

The motivation for the projects are economic in nature. LHM has conducted an extensive drilling programme over portions of EPL3500 and found there is an economic mineral resource that can be mined and processed. In addition, by converting the EPL in to a ML this will allow LHM to mine out all the uranium ore along the western boundary of ML140 because without this additional area, the mine pit slopes restrict the total volume of ore that can be mined from the existing ML. The project has the potential to benefit the country, society and the surrounding communities both directly and indirectly. Direct economic benefits will be derived from wages, taxes and profits. Indirect economic benefits will be

derived from the procurement of goods and services and the increased spending power of employees through the creation of new jobs at the mine.

1.3. INTRODUCTION TO THE ENVIRONMENTAL IMPACT ASSESSMENT

Prior to the commencement of the expansion project, the construction of the proposed new water pipeline and the upgrading of the power supply, authorisation is required in terms of the Environmental Management Act, 7 of 2007.

The Ministry of Mines and Energy (MME) is responsible for issuing mining authorisations, which must be obtained before mining can begin. Before a mining licence can be granted on EPL3500, an environmental impact assessment (EIA) is required to be undertaken by the project proponent and also authorised by the Ministry of Environment and Tourism (MET) in terms of the Environmental Management Act, 7 of 2007.

Although the proposed EIA regulations have not yet been promulgated in a final form, the draft regulations (April 2009) and Namibian Environmental Policy for EIA (1995) have been used as a guideline where relevant. The EIA process comprises three key phases: the internal screening, the scoping phase and the environmental impact assessment (EIA) / environmental management plan (EMP) phase.

This report is the scoping report. The main purpose of this scoping report is to generate terms of reference for the specialist studies and the EIA process that will enable the meaningful assessment of all relevant environmental and social issues. Within this framework, the required components of the scoping report (as per the draft EIA regulations) are included below, as are references to the relevant sections and appendices:

- description of the need and desirability (Section 1.2);
- description of the public participation process (Sections 2 and 10 and Appendices A to D);
- identification of relevant legislation, policies and guidelines (Section 3);
- environmental, geographical, social and cultural description of the property where the projects may be located (Section 4);
- description of the proposed activities (Section 6);
- description of alternatives (Section 7);
- description and assessment of potential impacts of the projects (Section 8);
- scope of assessments for the detailed EIA (Section 9); and
- curricula vitae of the people responsible for compiling the scoping report (Appendix E).

FIGURE 1-1: REGIONAL SETTING

FIGURE 1-2: LOCAL SETTING

1.3.1. EIA PROCESS

The EIA process and corresponding activities are outlined in Table 1-1.

TABLE 1-1: EIA PROCESS

Objectives	Corresponding activities
Project initiation/screening phase (January – February 2011)	
• Identify potential environmental issues associated with the proposed project • Preparation of internal screening reports • Appointment of consultants	• Project initiation meetings and site visit with the LHM team to discuss the project requirements, identify environmental and social issues and to determine legal requirements.
Scoping phase (February - May 2011)	
• Initiate the environmental impact assessment process. • Identify interested and/or affected parties (IAPs) and involve them in the scoping process through information sharing. • Identify additional potential environmental issues associated with the proposed projects, in consultation with stakeholders. • Consider alternatives. • Identify any fatal flaws. • Determine the terms of reference for additional assessment work.	• Meetings with the Ministry of Environment and Tourism (MET): Directorate of Environmental Affairs (DEA) and Parks and Wildlife (P&W) (4 March 2011) • Meeting with Ministry of Mines and Energy (MME) (4 March 2011). • Meeting with Ministry of Agriculture Water and Forestry (MAWF) (4 March 2011). • Written notification submitted to MET DEA. • Notify government authorities and IAPs of the project and EIA process (telephone calls, e-mails, faxes, distribution of background information documents, newspaper advertisements and site notices). • Scoping meetings with IAPs (22 and 23 March 2011). • Compilation of scoping report (April 2011). • Distribute scoping report to relevant authorities and IAPs for review (April 2011). • Forward finalised scoping report and IAPs comments to MET for review (April/May 2011).
EIA/EMP phase (May to September 2011)	
• Provide a detailed description of the potentially affected environments. • Assessment of potential environmental impacts. • Design requirements and management and mitigation measures. • Receive feedback on application	• Investigations by technical project team and appointed specialists. • Compilation of EIA and EMP reports. • Distribute EIA and EMP reports to authorities and IAPs for review (July 2011). • Forward EIA and EMP reports and IAPs comments to MET for review (August 2011). • Circulate the record of decisions for the EIA from MET to all IAPs registered on the public involvement database.

1.3.2. EIA TEAM

Metago SLR (Metago) is the independent firm of consultants that has been appointed by LHM to undertake the environmental impact assessments and related processes. Chris Herbert (project

manager) has twenty years of relevant experience and is a member of the British Royal Town Planning Institute. Brandon Stobart (project reviewer) has 14 years of relevant experience and is certified with the Certification Board for Environmental Assessment Practitioners of South Africa (EAPSA) as an Environmental Assessment Practitioner (EAP). The relevant curriculum vitae documentation is attached in Appendix E.

The proposed environmental project team is outlined in Table 1-2.

TABLE 1-2: PROPOSED ENVIRONMENTAL PROJECT TEAM

Team	Name	Designation	Tasks and roles	Company
Langer Heinrich environmental Project Team	Werner Petrick	Environmental specialist	EIA leader	LHM
	Charles Cleghorn	Environmental manager	Report review	LHM
NamWater environmental	NP Du Plessis	Senior Environmentalist	Report and Process input	NamWater
NamPower environmental	Danie Louw	Manager: Safety, Health, Environment & Wellness	Report and Process input	NamPower
Project management	Chris Herbert	Project Manager	Management of the process, team members and other stakeholders. Report compilation.	Metago SLR
	Brandon Stobart	Project Reviewer	Report and process review	
	Natasha Daly	Project Assistant	Project administration, compilation of reports and update of IAP database	
Specialist investigations	Hanlie Liebenberg-Enslin	Air quality	Air quality impact assessment	Airshed Planning Professionals
	Ian Jones	Soils and land capability specialist	Soils and land capability assessment	Earth Science Solutions
	Graham Young	Visual specialist	Visual impact assessment	Newtown Landscape Architects
	John Kinahan	Archaeologist	Heritage resource assessment	Namib Desert Archaeological survey
	Gerrie Muller	Social and Economic specialists	Socio-economic impact assessment	Metago
	Gerhard Liebenberg and Dawid de Villiers	Radiological specialists	Radiological impact assessment	Nuclear Energy Corporation of South Africa
	Theo Wassenaar, Joe Henschell, John Irish, Colleen Manheinmer and Mike Scott	Biodiversity	Ecological impact assessment	African Wilderness Restoration (lead consultant)
	Arnold Bittner	Groundwater	Groundwater assessment	Biwac

Team	Name	Designation	Tasks and roles	Company
	Gordon McPhail and Luke Wiles	Engineer	Surface water	Metago SLR
	Kai Witthueser	Geochemist and geohydrologist	Geochemical study	Metago SLR

2. SCOPING METHODOLOGY

2.1. INFORMATION COLLECTION

Metago used various sources to identify both the environmental issues associated with the proposed projects and the terms of reference for the required investigations.

The main sources of information for the preparation of the scoping report include:

- LHM's internal screening report;
- LHM's approved EIA and EMP Reports from the stage 3 approval in 2009;
- LHM's environmental monitoring reports;
- process flow diagram;
- site visits by Metago;
- consultation with the technical project team;
- consultation with the team of environmental specialists;
- consultation with IAPs; and
- consultation with relevant authorities.

2.2. PUBLIC CONSULTATION PROCESS

By consulting with authorities and IAPs, the range of environmental issues to be considered in the EIA process has been given specific context and focus. Included below is a summary of the people consulted, the process that was followed, and the issues that have been identified.

2.2.1. AUTHORITIES AND IAPS

The following authorities and IAPs are involved in the EIA process:

National authorities:

- Ministry of Environment and Tourism (MET);
    - Directorate of Environmental Affairs
    - Directorate of Parks and Wildlife;
- National Heritage Council of Namibia;
- Ministry of Mines and Energy (MME);
- Ministry of Agriculture, Water and Forestry (MAWF);
    - Department of Water Affairs;
- Ministry of Health and Social Services (MHSS);
- Ministry of Labour and Social Welfare; and
- Ministry of Works, Transport and Communications.

IAPs:

- surrounding farmers and landowners;
- tourism operators;
- surrounding mines and industries;
- non-government organisations and associations;
- local authorities (Erongo Regional Council, Swakopmund and Walvis Bay Municipalities); and
- any other people/entities that choose to register as IAPs.

The full stakeholder database for the project is included in Appendix B of the report.

2.2.2. STEPS IN THE CONSULTATION PROCESS

Table 2-1 sets out the steps in the consultation process that have been conducted to date:

TABLE 2-1: SCOPING CONSULTATION PROCESS WITH IAPS AND AUTHORITIES

TASK	DESCRIPTION	DATE
Notification - regulatory authorities and IAPs		
Written notification to MET	A notification letter and BID regarding the project was sent to MET. A copy of the letter is attached in Appendix A.	March 2011
IAP identification	The LHM database was updated to include additional IAPs and will be updated during the EIA as required. A copy of the IAP database is attached in Appendix B.	On-going
Distribution of background information document (BID)	BIDs were distributed via email to all IAPs on the project's public participation database and were available at the scoping meetings. A copy of the BID is attached in Appendix C. The purpose of the BID was to inform IAPs and authorities about the proposed projects, the EIA process, possible environmental impacts and means of inputting into the EIA process. Attached to the BID was a registration and response form, which provided IAPs with an opportunity to submit their names, contact details and comments on the project. NamWater and NamPower were consulted during the preparation phase of the BID.	March 2011
Site notices	A site notice was placed at the LHM gate. A copy of the site notice is attached in Appendix C.	March 2011
Newspaper advertisements	Block advertisements were placed as follows: • The Namibian • The Namib Times • The Republikein Copies of the advertisements are attached in Appendix C.	First week of March 2011
Scoping stage meetings and submission of comments		
Scoping meetings	Two public scoping meetings were arranged in Windhoek and Swakopmund. In addition, a focussed meeting was held with Earth Life Africa (Namibia) in Windhoek. The same project information was presented at all meetings. Minutes of the meetings are attached in Appendix C.	22-23 March 2011
Review of scoping report		
IAPs and authorities (excluding MET)	Copies of the scoping report have been made available for review at the following places: MET library and Windhoek National library, Walvis Bay public library, Swakopmund public library and the	April 2011

TASK	DESCRIPTION	DATE
review of scoping report	Langer Heinrich town office in Swakopmund. Electronic copies of the report will be made available on request (on a CD). Summaries of the scoping report have been distributed to all authorities and IAPs that are registered on the project's public involvement database via post and/or e-mail. NamWater and NamPower were consulted during the preparation phase of the Scoping Report. Authorities and IAPs have been given 30 days to review the scoping report and submit comments in writing to Metago. The closing date for comments is 8 May 2011. This was explained further in the distribution covering letter.	
MET review of scoping report	A copy of the final scoping report, including authority and IAP review comments, will be forwarded to MET on completion of the public review process.	May 2011

2.2.3. SUMMARY OF ISSUES RAISED

A description of issues that have been raised to date by authorities and IAPs is given in Appendix D to the scoping report. Issues raised pertain to:

- EIA procedure;
- technical/project related issues;
- decommissioning and closure;
- water supply;
- power supply;
- soils;
- biodiversity;
- groundwater; and
- socio-economic.

3. ENVIRONMENTAL LAWS AND POLICIES

The Strategic Environmental Assessment (SEA) for the Central Namib Uranium Rush (SAIEA, 2010) provides a comprehensive overview of relevant Namibian laws and policies. This section draws information from the SEA and other legal sources in Namibia.

The Republic of Namibia has five tiers of law and a number of policies relevant to Uranium mining and these include:

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

Key policies currently in force include:

- The EIA Policy (1995).
- The Minerals Policy of Namibia (2002).
- Namibia's Environmental Assessment Policy for Sustainable Development and Environmental Conservation (1994).

As the main source of legislation, the Namibian constitution makes provision for the creation and enforcement of applicable legislation. In this context and in accordance with its constitution, Namibia has passed numerous laws intended to protect the natural environment and to mitigate against adverse environmental impacts.

However, current Namibian legislation is a mixture of pre and post independence laws, some of which has yet to be repealed with modern, updated legislation. This has led to the development of gaps in the enforceability of parts of the legislation. These gaps stem from parts of current legislation not being geared to the needs of modern development in Namibia.

Namibia's policies provide the framework to the applicable legislation. Whilst policies do not often carry the same legal recognition as official statutes, policies can and are used in providing support to legal interpretation when deciding cases.

3.1. APPLICABLE LAWS AND POLICIES

In the context of uranium mining and related infrastructure in Namibia, there are several laws and policies currently applicable. Each of these is discussed in detail below.

3.1.1. NAMIBIA'S ENVIRONMENTAL IMPACT ASSESSMENT (EIA) POLICY OF 1995

This policy promotes accountability and informed decision making through the requirement of EIAs for listed programmes and projects.

3.1.2. ENVIRONMENTAL MANAGEMENT ACT

To enforce the policy on EIAs, the Environmental Management Act (EMA) (7 of 2007) has been compiled, but is yet to practically come into force because the required regulations are still in draft form. The EMA is expected to improve the management of impact assessments in Namibia through the establishment of an environmental commissioner, who will approve environmental plans and through requiring government agencies to work as a cohesive decision-making agents to ensure long term sustainable resource use.

3.1.3. THE ENVIRONMENTAL INVESTMENT FUND OF NAMIBIA

The Environmental Investment Fund of Namibia Act (13 of 2001) provides for the creation of a fund that will be used to support sustainable environmental and natural resource management. The source of the funds will include penalties/fines paid and/or property forfeited in terms of non-compliance and/or crimes as set out in EMA.

3.1.4. THE MINERALS ACT

The Minerals Act (33 of 1992) is another tool which is used to ensure compliance to the EIA policy by requiring that adequate environmental protection is guaranteed on projects prior to issuing a mining license or prospecting permit.

3.1.5. THE WATER ACT

The Water Act (54 of 1956) regulates the abstraction of groundwater for mining purposes. This Act is also an example of the older legislation which does not meet the needs of Namibia's modern development patterns. In recognition of this, the Water Resources Management Act (24 of 2004) has been drafted and published. It is still to come into force. This Act is more relevant to addressing Namibia's geohydrological and climatic contexts.

3.1.6. THE NAMIBIA WATER CORPORATION

The Namibia Water Corporation Act (12 of 1997) charges the corporation to supply bulk water, based on need and availability. The corporation is also charged with the duty of conserving water resources in the long-term.

3.1.7. THE FOREST ACT

The Forest Act (12 of 2001) allows for the declaration of protected areas in terms of soils, water resources, plants and other elements of biodiversity. This includes the proclamation of protected species of plants and the conditions under which these plants can be disturbed, conserved, or cultivated.

3.1.8. PARKS AND WILDLIFE MANAGEMENT BILL

The Parks and Wildlife Management Bill (2009) aims to provide a legal framework for the sustainable use and maintenance of Namibia's ecosystems, biological diversity and ecological processes; and repeals the Nature Conservation Ordinance (4 of 1975). This Bill allows the Namibian Ministries of Environment and Tourism and Minerals and Energy, to allow mining to take place within parks subject to the relevant assessments and authorisations.

3.1.9. NATURE CONSERVATION ORDINANCE

The Nature Conservation Ordinance (4 of 1975) provides for the declaration of protected areas and protected species.

3.1.10. NAMIB NAUKLUFT NATIONAL PARK MANAGEMENT AND TOURISM DEVELOPMENT PLAN

The Development plan (2004) provides a set of policies and guiding principles. A key topic is restoration of degraded ecosystems. The plan also states that no development should result in a decline of more than 10% in the population of a species of special interest (eg. *Welwitschia mirabilis).*

3.1.11. NATIONAL HERITAGE

The National Heritage Act (27 of 2004) provides protection and conservation of places and objectives of significance, as all archaeological and paleontological objects belong to the state.

3.1.12. RADIATION PROTECTION

The Atomic Energy and Radiation Protection Act (5 of 2005) is concerned specifically with ionizing radiation, including hazardous substances from radiation sources or materials. The Act lists all activities

requiring authorisation including possession of nuclear material, disposal, storage, and the operation or use of radiation sources.

Two draft regulations have been drafted to assist in the implementation of the Act and both of these regulations are expected to be promulgated in the near future, these are:

- Regulation for protection against ionizing radiation and for the safety of radiation sources (MoHSS, 2008a); and
- Regulations for the safe and secure management of radioactive waste (MoHSS, 2008b).

3.1.13. STRATEGIC ENVIRONMENTAL ASSESSMENT FOR THE CENTRAL NAMIB URANIUM RUSH

The final SEA report was published in September 2010. The SEA provides a big picture overview and advice on how to avoid and/or limit cumulative negative impacts and to enhance opportunities in the uranium sector. The Strategic Environment Management Plan (SEMP) provides a practical framework in terms of which existing and proposed mines can plan, collaborate, monitor, and manage issues that can impact on society, the economy and the environment. The relevant recommendations and findings from the SEA and SEMP will be used by the project team to guide the EIA. These will also be described in the EIA report.

3.1.14. EQUATOR PRINCIPLES

Equator Principles were compiled by representatives of various banks who identified the need to create a banking industry framework to address environmental and social issues in project financing. These principles are used as a benchmark for the financial industry to evaluate and manage the social and environmental impacts of projects financed through institutions which are Equator Principle signatories. The projects will be measured in accordance with the ten Equator Principles, which are as follows:

- Review and categorisation;
- Social and environmental assessment;
- Applicable social and environmental standards;
- Action plan and management system;
- Consultation and disclosure;
- Grievance mechanism;
- Independent review;
- Covenants;
- Independent monitoring and reporting; and
- Public reporting.

4. DESCRIPTION OF THE CURRENT ENVIRONMENT

This section has been compiled using information from LHM's approved EIA (Metago, 2009), the SEA (SAIEA, 2010) and from recent site visits undertaken by the EIA team.

The purpose of providing a brief description of the current environment in the scoping report is to give readers the situational context within which:

- the proposed projects may be developed;
- potential impacts can be identified; and
- the proposed terms of reference for the specialist investigations and the EIA process can be reviewed.

The description of the current environment in the EIA report will incorporate more detail and it will provide discussion on the links between the current environment and associated potential impacts. The EIA report will draw some of this additional detail from the proposed specialist investigations.

4.1. SITE DESCRIPTION AND SURROUNDINGS

4.1.1. SITE DESCRIPTION

The project sites include: an existing uranium mine, exclusive prospecting area, existing water pipeline and existing power supply line located in the northern part of the NNNP approximately 80 km east of Swakopmund. Land immediately surrounding the project sites is used for conservation and eco-tourism and there also other exclusive prospecting licence areas in the vicinity.

4.1.2. TOPOGRAPHY

The project area is located on the eastern edge of the desert zone in the NNNP. ML140 is situated within a 1-2km wide, flat bottomed valley between the Langer Heinrich Mountains to the north (1,152m above mean sea level amsl) and the Schiefer Mountains to the south (883 amsl). The valley is 710m amsl at its high point and descends gradually out to the west into the plain where the EPL is located at an elevation of approximately 550m amsl. Further to the west, both the proposed pipeline and power line sites occur on plains with a similar elevation to the EPL.

4.1.3. THE SURROUNDING BUILT ENVIRONMENT

This section should be read with reference to Figure 1-2.

There are no communities living in the immediate vicinity of the project area. The nearest significant communities are:

- farms to the north – the closest inhabited farm is called Modderfontein and is situated approximately 15km north of the ML;
- the Swakop River farming community – approximately 50km downstream of the ML
- Arandis – approximately 50km from the ML;
- Swakopmund – approximately 80km from the ML;
- Walvis bay – approximately 90km from the ML; and
- The Topnaar Nama nomadic community – along the Kuiseb River between 80 to 100km from the ML.

The Bloedkoppie tourist and recreation camping site lies approximately 1km from the southern boundary on the eastern portion of ML140.

Roads in the project area include:

- the partially tarred (approximately 85%) and partially gravel C28 that links Swakopmund to Windhoek;
- the LHM access (gravel) road that turns off the C28 and leads to the mine; and
- various unnamed gravel roads.

There is an existing LHM water pipeline that routes alongside the C28 road before turning down the mine access road. The section along the C28 is above ground with short sections below ground to provide crossing places for animals. The section along the mine access road is all below ground.

There is an existing 66kV power line that routes from the Kuiseb sub station to the C28 and then follows the access road to LHM.

There are a number of other mining and mineral exploration companies in the Erongo region that are engaged in either exploration, construction and/or operational activities. Those closest to LHM include:

- Swakop Uranium (Pty) Ltd;
- Rössing Uranium Limited;
- Bannerman Mining Resources Namibia (Pty) Ltd;
- Nova and
- Reptile Uranium (Pty) Ltd).

4.2. CLIMATE

4.2.1. RAINFALL AND MOISTURE

Annual rainfall in the relevant region consistently increases with distance from the coast. The project area is situated in a belt that receives on average less than 100mm of rain a year. The recorded rainfall data for the site indicates that rainfall events are uncommon with the chance of rain on any given day being calculated at less than 5%. The recorded annual rainfall ranges from less than 5mm to more than 100mm. The wetter months are January, February, March and April. The drier months are June, July and August. In dry periods, the region can experience periods of up to a year without any rainfall. Flash flooding has also occurred due to significant rainfall events. In addition, it must be noted that the LHM site is within the coastal fog belt. Fog events provide an important source of moisture to ecosystem functionality.

4.2.2. TEMPERATURE

The recorded annual average temperate is 24˚C. The typical range is from 5˚C to 45˚C. The variation between summer and winter months is approximately 7˚C for both maximum and minimum temperatures.

4.2.3. WIND

The predominant daytime wind is from the northwest, west and southwest. The predominant night time wind is from the southeast. During the spring and summer months, strong winds of more than 8m/s dominate from the westerly sector with infrequent winds from the other sectors. During the autumn and winter months, strong winds of more than 8m/s dominate from the easterly sector with some westerly winds still occurring. It is during the winter months that the highest wind speeds are recorded and these are associated with the “east winds”. The highest recorded wind speed in the area is 17.2m/s.

4.2.4. EVAPORATION

Evaporation figures are high, but the values are lower than those observed at desert locations further inland. This is because the Namib desert is not considered a particularly warm desert with maximum temperatures not exceeding 45˚C.

4.3. GEOLOGY

The project area is situated in the Damara Belt syncline. The oldest beds consist of psammitic rocks of the Nosib Group overlain by several thousand metres of politic rocks of the Swakop Group and the Khomas Subgroup all of Proterozoic age. Weathering and erosion of uraniferous granites are thought to be the source of uranium that precipitated to form secondary deposits such as the Langer Heinrich. The lowermost rocks of the Damara Sequence form the Langer Heinrich Mountain anticline. Overlying these

quartzites are schists comprised of interbedded fine grained metapelite, metagreywacke and calcsilitate beds.

The uraniferous fluvatile sediments in the Langer Heinrich Formation were deposited under flash flood conditions in deep paleo-channels. The sediments of the Langer Heinrich deposit consist mainly of angular clastic basement debris forming alternating bands of conglomerate, gravel and clay with the coarser fragments predominating. Carnotite is the main uranium mineral, occurring interstitially and bounding larger coarser clasts. Depths to the base of the paleo-channel are variable and sedimentary thicknesses up to 150m have been recorded. Grades tend to be highest in a central core zone with uranium distribution totally irregular and discontinuous.

4.4. SOIL AND LAND CAPABILITY

Three soil groupings have been identified in the project area. These include soils associated with mountainous terrain; soils associated with river systems and soils associated with the transition zone between mountainous terrain and the river systems.

Given the climatic and physical aspects described in the preceding sections, the natural land capability is limited to grazing, conservation, wilderness and eco-tourism.

4.5. SURFACE AND GROUNDWATER

The rivers in and near to the project area do not normally have surface flow because most surface water flow seeps into the ground and recharges the sub surface (groundwater) resources. Occasionally storm water entering the rivers in the upland areas reaches the sea. Perennial surface water occurs at a few isolated points in the rivers, but subsurface water is present in the larger rivers all year. The Swakop and Khan are the major ephemeral rivers in the region. The Gawib, in which the mine is situated, is an ephemeral river that has its catchment to the east of LHM and drains towards the west to the Swakop River. The Tinkas River also has its catchment to the east of LHM and it drains towards the north to the Swakop River. These rivers are shown on Figure 1-1 and Figure 1-2.

Groundwater is contained in the Tertiary Gawib River palaeo-channel sediments and in the Proterozoic basement rocks. The palaeo-channel in which the Langer Heinrich deposit is situated is within the Gawib River extending westwards beneath the Gawib Plain. In the Gawib River valley where mining operations currently take place, small isolated perched water tables occur between 5 and 50m depth, while in the higher elevated plateau area, located to the west of the current mining operations, the water level is between 30 and 60m.

The natural water quality within the palaeo-channel is saline, with total dissolved solids and uranium being measured at levels above those recommended for Namibian and/or international drinking water standards.

There is no reliance on localised water resources by humans in or adjacent to the project area. Surface and groundwater is however important for ecosystem functionality within and adjacent to the project area. People situated downstream of the Swakop Khan confluence abstract water from the Swakop River alluvial aquifers for irrigating crops and people located to the north of LHM the Swakop River abstract water from the basement rock aquifers for domestic and livestock watering purposes.

4.6. BIODIVERSITY

The ecosystem in and around the project area has an abundance of vegetation, vertebrate and invertebrate species. It also has significant value in terms of the ecosystem functions and processes in the project area. These include: the flow and capture of water, the flow of energy and nutrients, shelter for resting and breeding, and the linkages from movement of larger mammals and birds.

A brief discussion of vegetation, vertebrates and invertebrates is provided below.

4.6.1. NATURAL VEGETATION

The project area is situated in the Desert Biome within the Central Namib vegetation zone. This biome has significant vegetation endemism (species restricted to this biome), with over 30% of plants that occur in the Namibian section of the Desert Biome thought to be endemic. Vegetation communities that are known to exist in and around the project area include:

- Commiphora virgata – Zygophyllum cylindrifolium – sparse shrublands on quartzite slopes;
- Petalidium variabile – Aloe dichotoma – sparse shrublands on granites;
- Sterculia Africana – Enneapogon – sparse shrublands in quartzite ravines;
- Petalidium variabile – Stipagrostis hochstetteriana – sparse shrublands in boulder washes;
- Eragrostis nindensis – Trianthema triquetra – sparse grasslands on conglomerates;
- Adenolobus pechuelii – Zygophyllum cylindrifolium – sparse grasslands on pegmatite intrusions;
- Enneapogon desvauxii – Pegolettia senegalensis – sparse grasslands on schist ridges;
- Petalidium canescens – Commiphora saxicola – sparse grasslands in schist runoffs;
- Zygophyllum stapfii – Sesamum marlothii – riverine shrublands in narrow schist washes;
- Acacia erioloba – Stipagrostis damarensis – sparse shrublands with low trees in sandy rivers;
- Acacia erioloba – Stipagrostis ciliata – sparse shrublands with low trees on river terraces;
- Adenolobus pechuelii – Stipagrostis ciliate – sparse shrublands with low trees in shallow washes;
- Azioanthemum rehmannii – Monechma desertorum – sparse grasslands on gravel plains; and

- Salsola tuberculata – Jamesbrittenia barbata – sparse grasslands on quartz gravel plains.

Within these vegetation communities a number of Red Data species exist including threatened, low risk and protected species.

4.6.2. VERTEBRATES

Several vertebrate species have their eastern, western, northern or southern distribution boundaries in the vicinity of the ML, therefore explaining the high diversity of identified vertebrates. Some of these vertebrates are permanent residents while others are regular commuters or occasional transients.

In broad terms, the groups of vertebrates include: mammals, reptiles (including inter alia: snakes, skinks, lizards, geckos, and others), frogs and birds. At least 44 species of mammals, 45 species of reptiles, 2 species of frogs and over 200 species of birds occur in and around the ML. Of these, 4 species of reptiles are of special conservation significance because they are newly discovered, have limited ranges, and/or very little is currently known about them: the Schieferberg sand lizard, the Damara tiger snake, the Delalande's blind snake, and the Husab sand lizard.

4.6.3. INVERTEBRATES

Invertebrates are a key component of any ecosystem in terms of absolute numbers, biomass and ecosystem function. Invertebrate groupings for the project area are best described by trophic guilds and habitats. Trophic guilds are aggregates of species that share similar trophic resources, i.e. depend on the same food sources within a particular habitat. The following invertebrate trophic guilds been identified:

- Herbivores – eating live plant matter, including:
    - leaf-eaters (folivores);
    - flower feeders – includes nectarivores (nectar feeders) and palynivores (pollen feeders);
    - fruit feeders – includes frugivores (strict fruit feeders) and granivores (seed eaters);
    - sap feeders (mucivores);
    - wood eaters (xylophages);
    - grass eaters (graminivores); and
    - fungus feeders (fungivores).
- Recyclers – eating dead plant or animal remains or products, including:
    - detritus feeders (detritivores) – eating dead, dry plant remains;
    - dung feeders (coprophages) – eating vertebrate faeces; and
    - scavengers (necrophages) – eating dead animal remains.
- Predators – killing and eating other animals.
- Parasites – living in or on other animals, feeding on them without killing them outright.

4.7. RADIATION

Radiation exposure can occur via the following four radiation pathways within the project area:

- direct external exposure to radiation from mineralised sources;
- aquatic pathway through radio-nuclides that are carried in surface and groundwater;
- atmospheric pathway through radon gas and radio-nuclides in dispersed dust; and
- 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).

The estimated current public doses (Metago, 2009) from these pathways are all less than the recommended limit for public doses, being 1 milli-Sievert per annum from all sources excluding medical and natural sources (SEA, 2010).

4.8. HERITAGE RESOURCES

Archaeological sites have been discovered within the project area. These include:

- stone artefact surface scatters;
- stone hunting blinds;
- rock shelter sites;
- graves; and
- historical artefacts from the recent past, e.g. German fortifications.

4.9. TRAFFIC

Vehicles travel to LHM via the C28 and LHM access roads. The section of the C28 up to the LHM access road is partially tarred (approximately 85%). The LHM access road is gravel. In excess of 300 vehicle trips a day occur on the C28 between Swakopmund and the LHM access road (Metago 2010). This traffic volume is split between regional traffic, tourism traffic, exploration traffic and mine traffic. LHM contributes approximately 60 vehicle trips per day.

4.10. AIR QUALITY

Sources of air pollution in the project area include:

- windblown dust;
- dust from materials handling, material processing, mining, vehicle entrainment on gravel roads;
- fume emissions from diesel generators, heaters/boilers; and

- fume generation form vehicle exhaust systems.

4.11. NOISE AND VIBRATION

Existing noise sources within and around the project site include:

- natural sounds from wind, animals and birds;
- vehicle movement on the public road network; and
- operational activities including: drilling, blasting, vehicle movement, materials processing and power generation.

Blasting currently occurs every other day at the existing mine between 2pm and 5pm.

4.12. VISUAL ASPECTS

One of the major attractions to tourists visiting the Namib Naukluft Park is the scenic beauty of the park, and its associated sense of place. This is primarily based on the limited human activity and structures inside the park, coupled with a sense of remoteness and the value of the visual resource.

The most significant tourism and recreation site in the vicinity of the project area is Bloedkoppie. This site is approximately 7km to the east of the current operations and approximately 1km from the southern boundary on the eastern portion of ML140.

4.13. SOCIO-ECONOMIC STRUCTURE/PROFILE

The regional setting of the project area is included in Table 4-4 and illustrated in Figure 1-1 and Figure 1-2.

TABLE 4-4: REGIONAL SETTING

Region	Erongo Region
Local authorities	Erongo Regional Council; Swakopmund and Walvis Bay Municipalities
National authorities	MET – Parks and Wildlife
Project location	Namib Naukluft Park
Closest towns/communities	Swakop River farmers, Swakopmund, Walvis Bay, Arandis, and Topnaars community.
Catchments	Swakop River

4.13.1. SURFACE RIGHTS AND LAND TENURE

Land surface rights in the project area and the surrounding Namib Naukluft Park are owned by the Namibian Government care of the MET – Parks and Wildlife.

4.13.2. DEMOGRAPHIC CHARACTERISTICS

The population of the Erongo Region is relatively small and densities are low. Most of the population is found in urban areas with a majority living in the towns of Walvis Bay, Swakopmund, Omaruru, Karibib, Arandis, Usakos, Uis and Henties Bay. Socio-economic status varies from the extremely poor to the wealthy. This translates into a significant range in living standards with the poorer part of the population being exposed to greater challenges with regard to housing, water and sanitation, schooling, medical care, employment and the social and economic impact of HIV/AIDS.

4.13.3. ECONOMIC ENVIRONMENT

The main activities of the economy in the Erongo Region are:

- mining;
- fishing;
- tourism
- commercial farms;
- subsistence farming; and
- port related activities.

The main economic activities in the Erongo Region are concentrated in the two coastal towns of Walvis Bay and Swakopmund, as well as the surrounding mines. The smaller towns offer limited employment opportunities, while opportunities in agriculture, small-scale farming and tourism are scattered widely throughout the region.

An increase in economic activity will most likely lead to the in-migration of people to Walvis Bay and Swakopmund in particular. People migrate to these areas for various reasons, but two of the more common reasons are to seek jobs and to establish businesses. The sectors that attract these people are mining, tourism, fishing and agriculture.

5. CURRENT OPERATIONS AT LHM

5.1. OVERVIEW OF EXISTING ACTIVITIES AND SURFACE INFRASTRUCTURE

The current approved LHM infrastructure and activities are shown on Figure 5.1 and are summarised in Table 5.1 below.

TABLE 5-1: SUMMARY OF CURRENT/APPROVED LHM INFRASTRUCTURE AND ACTIVITIES

Infrastructure	Description
Access Road	The access road to the mine joins the regional C28 road. All employees, contractors, input materials, waste materials and product are transported to or from the site use this road. From the C28 the traffic flows are split between the roads to Walvis Bay, Swakopmund and Windhoek.
Airstrip	A 1.3km gravel runway (for emergency landings) is located on the gravel plains on the western side of ML140 about 300m north of the mine access road.
Coarse rejects stockpiles	There are currently 2 stockpiles, one east of the existing process plant and one south of waste rock dump A.
Exploration camp site	An exploration drilling contractor camp is located in the south east of ML140, approximately 5km east of the processing plant. Approximately 30 people are on site at any one time.
Contractor lay-down area	This is a site used to accommodate any short term contractors. It consists of a yard with storage and ablution facilities. It is located within ML140 to the west of the processing plant and was the site of the original Stage 1 construction camp.
Conveyors	Conveyors are used to transport material at the front end of the processing plant between the crushers, scrubbers and some of the stockpiles.
Exploration drill rigs and network of holes	Exploration drilling is a continuous activity and is used to upgrade the mineral resource on an annual basis as well as assist detailed mine planning.
Explosives	The explosives compound is located on the eastern side of the current temporary tailings storage facility and is accessed by a single controlled access road. It houses heavy energy fuel (HEF) non-explosive oxidising agent storage tanks with an unloading bay and there are two fenced explosive magazines.
Fuel storage facilities	There are a number of above ground diesel and heavy fuel oil (HFO) storage tanks located in covered and/or bunded areas adjacent to the existing processing plant. Small petrol drums (400 litres in total) are stored in a bunded area. This petrol is used for small mining vehicles (Rhinos, etc.).
Internal haul roads	There are a number of internal dirt haul roads within ML140. Trucks are used to haul ore, waste rock and coarse reject materials.
Laboratory	Samples of solids, liquids, pulp and resin from the processing plant are analysed at the assay laboratory. Analyses include: • XRF (uranium and vanadium mainly) • Ore moisture • Titrations • Total suspended solids The laboratory is also equipped for analysis of environmental (dust and water) samples. The results from the analyses are used for process control, metal accounting purposes and water quality and dust monitoring. Any excess sample volumes are returned to the process before the sample containers are cleaned out for re-use.
Low grade stockpiles	Currently low grade ore material is stockpiled to the east of the processing plant and provision has been made for additional stockpiles within ML140, as

	required.
Offices, stores and workshop	The main office complex is located within the security fence directly north of the existing processing plant. An engineering block is located between the process dam and the engineering workshops. Activities associated with the workshops include painting, grinding, welding, repairs and general maintenance. The front end process control room is located inside the laboratory building which is situated adjacent the Counter Current Decantation tanks in the plant area. The back end process control room is located in the recovery building. The mining contractors have their own office and workshop with a fuel storage facility and tyre workshop directly to the east of the main office complex. The following items are kept in store: reagents – sodium carbonate, sodium bicarbonate, sodium chloride, flocculant, hydrogen peroxide, sodium hydroxide, sulphuric acid and ferrous sulphate; personal protective equipment, paint and general maintenance equipment, etc.
Open pit mine	Mining is performed using conventional open pit mining methods. In accordance with current approvals the dimensions of the total mined areas will be in the order of an 11.5km (east/west) long pit. The average width (north/south) will be 400m and the average depth will be 30m, although the deepest point will be 80m below ground surface. Current mining areas include pits B and D which are situated to the west of the processing plant.
Open pit de-watering facilities	Water seeping into the pits is pumped via pipelines to either the TSF or process water dam, or stored in the pits and occasionally used for dust suppression.
Ore stockpiles (ROM)	The mined ore is stockpiled directly east of the existing processing plant on the ROM pad, south of pit A.
Pipelines	A number of internal pipelines are used for the transportation of water, gas, diesel, air, reagents, process plant solution and tailings. The main external pipeline is for water supply from NamWater via the Swakopmund reservoirs. The pipeline has a number of pumping stations along the route. The pipeline design capacity is 2 million m³ per year. A shorter pipeline supplies water from boreholes in the Swakop River and LHM have authority to receive 0.5 million m³ per year from this source.
Power lines, substations and diesel generators	Electricity is supplied from the NamPower Kuiseb sub station which connects to the mine via a 50km 66kV power line and supplies approximately 16.6 MVA. A diesel generator facility with a capacity of 30 MVA is used to augment the NamPower supply. Power is distributed via an on site sub station and internal power lines.
Processing plant	The existing processing plant is located more or less centrally of ML140. The construction of additional processing equipment approved for the stage 3 expansion is currently underway. Key process components are described in Table 5-2.
Sewage plant	A bio-treatment sewage treatment plant with three modules is located directly west of the main office buildings and have a capacity of 50m³ a day
Tailings storage facility (TSF) and thickener	The temporary TSF (TSF1 and TSF1 extension) is situated partially on top of the ore body to the east of the main office and processing plant and will be re-treated and removed as part of future mining operations. The new permanent TSF (TSF2) and thickener facility which is currently under construction are located to the west of the processing plant. Supernatant water is pumped back from this facility to the processing pond via a pipeline to be recycled back into the process plant. Ongoing studies are considering in pit tailings deposition as outlined in both the 2005 and 2009 EIA Reports.
Topsoil stockpiles	Topsoil is currently stockpiled at various locations throughout ML140.
Waste Rock Dumps (WRDs)	There are WRDs located to the north and east of Pit A and adjacent to TSF2 to the west. A number of additional WRDs will be required as future mining expands.
Radioactive waste disposal	A disposal site for radioactive contaminated materials/waste (old personal protective equipment, drums, pipes, etc.) has been established within WRD A.
General and non	Facilities are provided for sorting and temporary storage prior to removal and

radioactive hazardous waste	disposal. Final disposal of these waste types is by contractors at licensed facilities in Walvis Bay and Swakopmund.
Water storage facilities	The lined raw water "turkey's" dam stores water that is pumped from the Swakop River. NamWater water is stored in four reservoirs to feed the process plant as needed. The process water dam is a lined facility and receives water from the TSF return circuit, the open pits, the treated sewage water circuit, laboratory, wash bays, plant run off and the process plant circuit. As mining advances the worked out Pit F will be used to contain storm water.
Water treatment	A reverse osmosis plant (water treatment plant) is used to treat water as required.

FIGURE 5-1: APPROVED MINE AND INFRASTRUCTURE LAYOUT

5.2. PROCESS FLOW – MAIN PROCESS COMPONENTS

A process flow of the main process components is presented in Table 5-2.

TABLE 5-2: MAIN COMPONENTS OF THE PROCESS FLOW

Stage	Description
Open pit mining	Areas to be mined are stripped of topsoil which is then stockpiled. Additionally any sub-soil material is also removed separately and stockpiled for future restoration of the mining areas. Any vegetation deemed able to be relocated is then transplanted in a suitable location.
Crushing and scrubbing	Ore material from the ROM pad is fed through a vibrating grizzly feeder and fed in to a jaw crusher. Crushed material is conveyed to the three scrubbers which serves two purposes. Firstly the scrubber moisture breaks down the calcrete that holds the agglomerates together and secondly the scrubbers remove the uranium bearing coating from the quartz pebbles.
Cyclones and screening	Screened undersize from the scrubbers is pumped to the cyclones. Screened oversize is discharged to additional crushing circuits. Cyclones are used to further separate the material. Cyclone overflows that contain the fine fraction reports to the pre-leach thickener after screening at 300-500 microns whilst cyclone underflow undergoes a three stage screening process to recover all the material smaller than 500 micron. This material also reports to the pre-leach thickener. All material bigger than 500 microns is discharged via conveyor onto the low grade coarse rejects stockpiles.
Pre leach thickeners	The smaller than 500 micron slurry material is pumped to pre leach thickeners where it is thickened to an underflow density up to 40% solids by mass with the assistance of flocculant. Thickener overflow is recycled back to the scrubbing process.
Leaching	The thickener underflows are pumped to separate conditioning tanks, servicing either the original leach circuit or the new leach circuit, where sodium carbonate and sodium bicarbonate are added. The cold slurry reporting to the leach circuit is pre-heated by hot slurry leaving the leach circuit. The cold slurry is pumped through either a set of spiral heat exchangers or a vacuum process that transfer the heat and steam from the hot slurry to the cold slurry. The warm slurry is then further heated through a second set of heat exchangers by hot water. The temperature of the slurry is elevated to more than 75 degrees C. The hot water is heated to a temperature of 97 degrees C in either electrical heaters or diesel burners or heavy fuel oil (HFO) boilers. The slurry is then discharged into either the original leach circuit comprising cascading concrete leach tanks or to the new circuit comprising two larger concrete tanks. All leach tanks are fitted with agitators to ensure optimum slurry mixing. The pH is continuously monitored and sodium carbonate and sodium bicarbonate are added as required to maintain the target of close to pH10. After 32 hours the leachate exits the leach tanks and is pumped through the heat exchangers to pre-heat the fresh leach feed slurry.
Counter current decantation (CCD)	The CCD circuit comprises five high density thickeners and six high rate thickeners (fed as two parallel rows of three) operating in a series to make up a single Counter Current Wash circuit. Flocculant is dosed to each thickener to assist with the settling of solids. In the final CCD stage underflow is transferred to the tailings sump before being pumped to the TSF. Each CCD unit allows for the extensive internal dilution to take place as solids contents of 8% and less are required to achieve acceptable settling rates and consolidation. Clarifier overflows are collected in pregnant solution transfer sumps and pumped to the pregnant solution holding

	tank.
Ion exchange	The continuous fixed bed ion exchange system recovers uranium from the CCD pregnant solution. Twenty four extraction columns are used to absorb the uranium from solution on to a weak base resin. Once the resin is fully loaded it is eluted with sodium bicarbonate to strip the resin of uranium into a high grade concentrate solution. Thereafter the columns are put back into an adsorption stage and the process repeats itself.
Precipitation, thickening and centrifuging	The concentrate solution from the ion exchange/elution circuit (eluate) flows to a uranium precipitation holding tank where the pH of the solution is increased to +/- 12 through the addition of sodium hydroxide. This precipitates the uranium as sodium diuranate (SDU) which is collected in a thickener to increase the slurry density. The thickened slurry is then pumped to a continuous wash tank to remove high levels of sodium hydroxide and then pumped to a batch precipitation tank where it is re-dissolved in sulphuric acid at a pH of 3.6. Once all the SDU is dissolved, hydrogen peroxide id added at a controlled rate, together with sodium hydroxide (to maintain the correct pH) which causes the uranium to precipitate as UO4. The residence time for this stage is approximately 10-30 minutes. The batch tank underflow containing the (UO4) is pumped firstly to a product thickener and then to a dewatering centrifuge with dewatered uranium solids discharging into the uranium dryer feed hopper. Centrate from the centrifuge is recycled to the product thickener to recover any misplaced solids.
Product drying and drumming	From the dryer feed hopper the solids are fed to one or two oil heated dryers using an enclosed screw feeder. Drying takes place as 180 degrees C for 1 hour to drive off free and crystalline water. The dry powder (final uranium oxide product) is then packaged in drums, weighed and sealed in preparation for transportation.

5.3. ADDITIONAL INFRASTRUCTURE APPROVED BY STAGE 3 EXPANSION (NOT YET IMPLEMENTED)

Not all the new infrastructure approved by the Stage 3 expansion has commenced construction and may be superseded by the proposed Stage 4 expansion, but they form part of the permitted baseline for the site and are included below:

- satellite mine workshop;
- additional crushing and scrubbing capacity at the satellite location to the west of the permanent TSF;
- heap leach pads; and
- temporary construction camp.

6. PROPOSED PROJECT

6.1. OVERVIEW OF THE PROPOSED PROJECT

LHM plans to increase uranium oxide production from 5.2 to 10Mlbpa and to convert EPL3500 in to a ML to enable the existing mine footprint to extend into this area. The main components of the project include: the expansion of the existing processing plant (stage 4 expansion), the conversion of EPL3500 to a ML, an increase in the mine area and in the mining extraction rate, and additional support infrastructure and services, see Figure 6-1. The current remaining LHM life of mine (LOM) within ML140 is 19 years. The net effect of the proposed expansion, whilst increasing the production and footprint of the mine, will be a LOM reduction from 19 years to 17 years. The expansion project will also require additional water and power which will be provided by a new water pipeline and an upgraded power supply.

At this stage in project planning, a number of location and technology alternatives are still under consideration. These alternatives are mentioned below as part of the proposed project description. The criteria for choosing between alternatives are discussed in Section 9 of the scoping report.

6.2. STAGE 4 PROJECT EXPANSION

6.2.1. MAIN PROCESSING PLANTS

The expansion study is based on increasing the annual uranium oxide production from 5.2 to 10Mlbpa through the construction of a new conventional processing plant (to take production of uranium oxide to 8.7Mlbpa) plus a possible heap leach plant for the treatment of low grade ore (to produce an additional +/- 1.3Mlbpa uranium oxide).

Conventional Processing Plant

The new conventional plant will be similar to the existing plant in many areas but will process approximately 70% more ore than existing. It will comprise of the following key sections, see Figure 6-2:

- ROM pad and primary crusher;
- scrubbing and size classification;
- recycle crushing and conveyors together with an ore-sorting facility;
- pre-leach thickening;
- heating and leaching;
- resin-in-pulp uranium concentration and elution;
- tailings thickening (in plant);
- tailings thickening (located closer to in-pit deposition sites);

- reagent mixing;
- SDU precipitation;
- Uranium oxide precipitation, drying and packaging; and
- various water and air storage facilities and related reticulation circuits.

FIGURE 6-1: ORIENTATION MAP OF THE LHM ML 140 AND EPL 3500 WITH EXISTING AND PROPOSED INFRASTRUCTURE

FIGURE 6-2: LHM CONCEPTUAL PLANT LAYOUT

The block flow diagram for the proposed Stage 4 circuit is presented in Figure 6.3. The blue blocks represent the proposed plant and the green area the proposed plant if radiometric sorting is included. Radiometric sorting of the ROM is currently being investigated if successful the upfront crushing circuit would be modified and there could be some changes to stockpile configuration and grades.

In the blue circuit the product of the primary crusher is fed directly to the scrubber. The scrubbed product is passed over a screen and the coarse material is recycled to the scrubber after additional crushing. The screened material is then treated in a separator to remove the coarse waste and the fines containing slurry is thickened to 75% solids before being diluted with process water and being pumped to the leach section. About two thirds of the thickener overflow is treated by reverse osmosis (RO) to remove salts.

The leach feed will be heated through heat exchange. This should raise the temperature to about 70^{o}C. The heated slurry will then be further heated by steam injection to 95^{o}C.

The cooled leached slurry then proceeds to resin-in-pulp section for uranium adsorption onto ion exchange resin. The barren slurry is thickened. The thickener overflow is recycled to provide process water and the underflow is pumped to the tailings storage facility (TSF).

The remainder of the circuit is very similar to the Stage 3 design where the loaded resin is eluted using sodium bicarbonate, the resin is returned to the adsorption section and the eluate is treated with sodium hydroxide to precipitate sodium diuranate (SDU). The SDU is thickened and washed and then dissolved in sulphuric acid and the pH raised to about 3.5. The uranium is then precipitated with hydrogen peroxide (using sodium hydroxide to control the pH). This precipitate is then washed, dried and drummed for sale as uranium oxide.

In the situation where radiometric sorting is included ahead of the scrubber the primary crusher product is passed over three screens. The particles greater than 160 mm are fed through a crusher and recycled to the screens. The particles in the size range 65 to 160 mm are fed to the coarse rock radiometric sorter and the particles in the size range 25 to 65 mm are fed to the fine rock radiometric sorter. The particles with uranium grade less than 100 ppm are rejected as waste. The accept fractions plus the ROM material finer than 25 mm are then combined and fed to the scrubber. The downstream part of the circuit is unchanged.

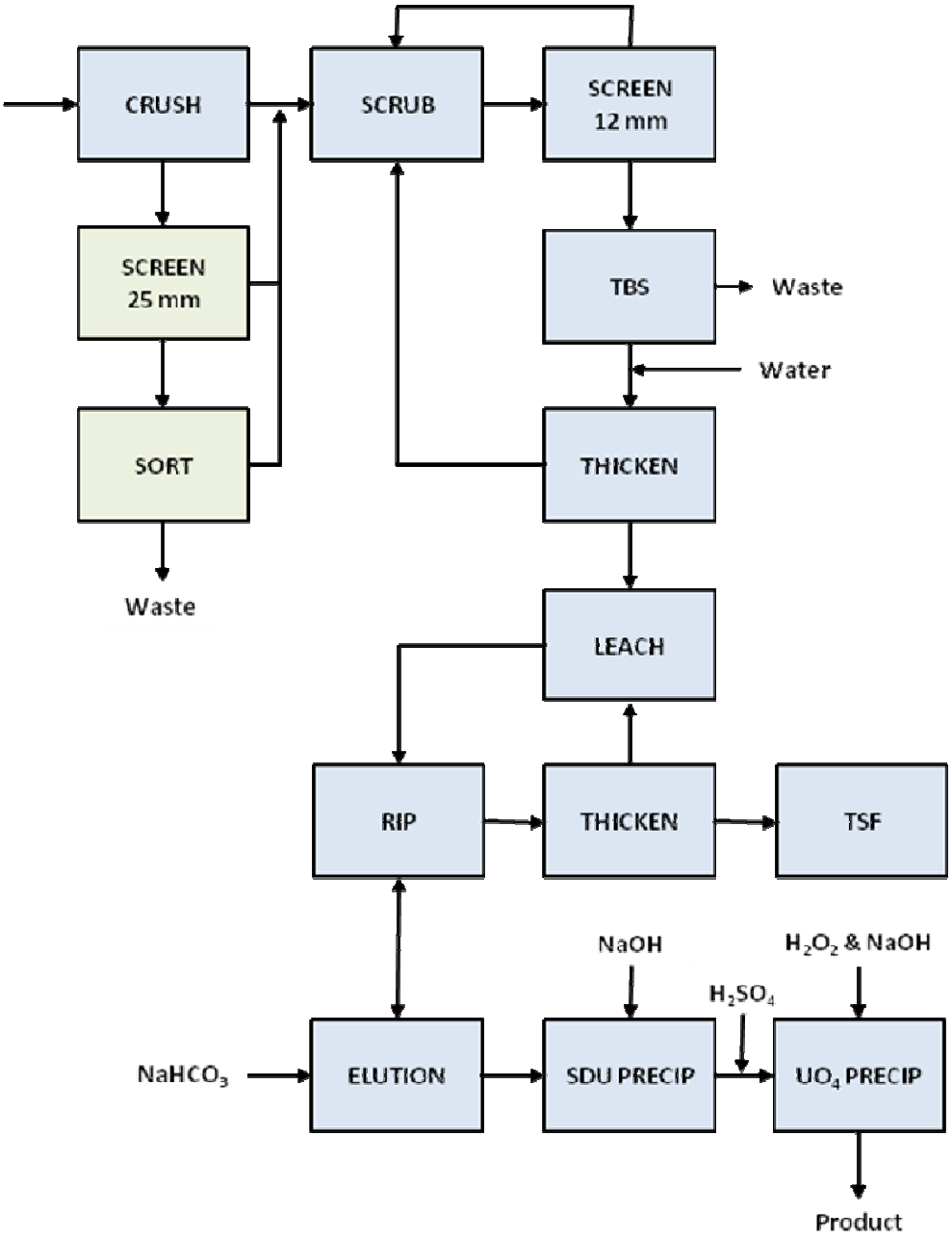

FIGURE 6-3: BLOCK FLOW DIAGRAM OF PROPOSED STAGE 4 PLANT

Low Grade Ore Treatment Plant

There are currently 3 options being investigated for low grade ore treatment and these are considered further in the Alternatives section of this report.

6.2.2. OTHER PROCESSING FACILITIES

Besides the above mentioned processing plants the following two facilities are likely to be required (it is intended that the uranium recovery equipment associated with both these 2 potential operations will be located within the boundary of the new, Stage 4 processing plant):

Tailings retreatment

Future mining activities currently include the reclamation of the temporary tailings storage facility (TSF1 and TSF1 extension). This will be achieved by hydraulic reclamation (using water cannons) and the pumping of the slurry to the new tailings disposal sites. However, it is anticipated that much of the contained uranium will be easily leachable (testwork is planned for 2011 to validate this assumption), and that it may be possible that by simply re-slurrying the material with water that most of the uranium will report to the solution phase. If this occurs then all that would be required to recover most of the uranium before the slurry is re-deposited in the new dam will be to pass it through a de-sanding step to remove the coarse solids followed by a small RIP plant. The loaded resin from this plant will then be processed at the main plant for uranium recovery.

Coarse rejects wash plant.

Existing stockpiles of coarse rejects have a significant amount of fines which could be screened out and processed for uranium recovery. The screened, coarse material would then be discarded together with the coarse rejects from on-going operations. Laboratory testwork conducted at site has indicated that additional uranium is recoverable by rescreening this material. To achieve this the solids will be re-pulped and pumped across a screen to separate the +0.5mm from the –0.5mm material. The coarse product will be re-deposited elsewhere and the fines pumped across to the stage 4 leach plant for uranium recovery.

6.2.3. WASTE MANAGEMENT

Tailings

There is no change to the approved concept of tailings disposal, which is placement into the permanent above ground tailings facility and into some of the mined voids. The above ground TSF (TSF2) is currently under construction. The backfilling of the mine voids was approved under the Stage 3 EIA and the design concepts are being refined for implementation within the next five years.

Waste rock

Final mine planning information indicates that additional permanent waste rock dumps are required.

Non mineralised waste

Existing arrangements for radioactive, hazardous (non radioactive) and general waste will remain as is. For radioactive waste this means on site disposal within the waste rock dumps and for hazardous and

general waste existing arrangements with contractors for disposal at licensed facilities in Walvis Bay and Swakopmund will continue.

6.2.4. OTHER SURFACE INFRASTRUCTURE

Besides the processing plants and mining, other surface infrastructure will include the following:

- *New water supply pipeline*: The existing water pipeline is too small and an additional pipe will be required, see section 6.4 of this report.
- *Electricity*: The existing grid power supply is inadequate and will need a significant up-grade, see section 6.5 of this report. In addition back up generation capacity may be required.
- *Temporary construction camp*: This could be required during the Stage 4 construction phase.
- *Sewage treatment plant:* The existing plant will be upgraded.
- *Water storage/treatment capacity:* Additional capacity will be required.
- *Fuel storage:* Existing facilities will be used but with more frequent deliveries.
- *Offices, stores and workshops:* Any new facilities will remain within the existing ML140.
- *Borrow pits:* Additional borrow pits will be required.
- *Top and sub soil storage:* Additional storage areas will be required.

6.2.5. TRAFFIC

The current mine vehicle fleet will need to be expanded to handle the increase in mining activities. In this regard additional excavators, haul trucks, drill rigs, water carts, bulldozers and graders will be required.

Existing traffic levels on the C28 associated with LHM are in the region of 260 vehicle trips a week with a daily maximum of 60 trips a day of which an estimated 30 are heavy duty vehicles (HDVs).

In the Stage 4 operational phase the proposed traffic levels will increase to an average of 320 vehicle trips a week with a daily maximum of 70 trips a day of which an estimated 30 will be HDVs.

6.2.6. EMPLOYMENT AND HOUSING

The construction phase of all project components is associated with approximately 1000 additional temporary contractors. These people will either be housed off site in Swakopmund and Walvis Bay or at the on site contractors construction camp.

The operational phase of the stage 4 expansion is associated with approximately 100 permanent additional employees and 50 permanent contractors. These people will be housed off site in Swakopmund and Walvis Bay.

6.3. CONVERSION OF EPL3500 TO A ML

This element of the project entails the conversion of EPL3500 to a ML. All of the ore that will be mined from the pits within the existing EPL3500 (new ML) will be processed by the current and proposed processing plants within ML140. It is unlikely that any new processing facilities need to be installed within the boundary of the EPL3500. The following activities and infrastructure are planned for the proposed new ML:

- mine pits;
- mining activities similar to that occurring on ML140, including drilling and blasting, excavating of material with excavators and load and haul via dump trucks;
- depending on the type of material, it will either be hauled to the ore stockpiles in ML140 or stockpiled on one or more waste rock dumps on the new ML;
- haul roads;
- waste rock dump(s); and
- water tanks for dust suppression (haul roads).

The expansion of mining activities in to EPL3500 by converting it to a ML will enable the mining out of all the uranium ore along the western boundary of the existing ML140 because without this additional area the mine pit slopes restrict the total volume of ore that can be mined from the existing ML.

6.4. NEW WATER PIPELINE

The expansion project will require an additional approximately 5 to 6 Mm^3/a of water (to be sourced from proposed desalination plants) and it is proposed that this will be pumped through a second pipeline that will run parallel to the existing pipeline which serves LHM. This EIA process will cover the section of the new pipeline which will serve LHM, this will run for a short section above ground along the C28 (from the Welwitschia drive turn-off) before turning down the existing LHM access road (see Figure 1-2). It is proposed that the new LHM water pipeline along the mine access road will be underground, as is the existing water pipeline.

The remainder of the supply line, which will run above ground alongside the existing water pipeline following the C28, is called the Shared Swakop South Water Supply Scheme and is the subject of a separate EIA process being conducted on behalf of NamWater.

6.5. UPGRADED POWER SUPPLY

NamPower currently supplies 14 MW of power to Langer Heinrich Mine (LHM) via a 66kV line from NamPower's Kuiseb Substation. The stage 4 expansion project will increase the total power demand to approximately 60 MW if electric boilers are used or 40 MW if HFO boilers are used as part of the proposed upgrades. This projected increase in power demand will necessitate an upgrade/replacement of the 66kV power supply infrastructure to 132kV. This applies both to the power line and the Kuiseb sub station.

The new 132kV transmission line will either be a 5-woodpole configuration or a concrete single pole structure with a double-circuit facility, but a portion of the line may be a double-circuit line to minimise the line footprint in the desert environment for power supply to other mining developments.

The new 132kV power line to LHM will run adjacent to the existing 66kV power line and once commissioned the 66kV line will be removed.

6.6. PROJECT SCHEDULE

Subject to approval, construction of the various components of the project is planned to begin in first half of 2012 and the construction period will be approximately 2 years.

7. ALTERNATIVES

7.1. INTRODUCTION

This section considers alternatives for all components of the proposed projects included within this scoping report:

- Stage 4 expansion;
- EPL Conversion
- NamWater pipeline; and
- NamPower supply.

7.2. STAGE 4 EXPANSION ALTERNATIVES

7.2.1. ALTERNATIVE SURFACE INFRASTRUCTURE LAYOUTS

As mentioned in section 6 of this report, various options for the position/type of certain surface infrastructure facilities are being considered as follows:

- the possibility of building and operating the heap leach facility on an impermeable plastic sheet in the mined out pit is being considered as an alternative to the aboveground heap leach facility that will be located on top of future waste rock dumps;
- whether to use electrical or HFO boilers;
- alternative locations for future waste rock dumps on the eastern side of ML140; and
- alternative positions are being considered for support infrastructure such as workshops.

The related selection criteria parameters to be applied may include:

- ecological;
- archaeology/heritage;
- groundwater;
- surface water;
- land use;
- land capability;
- long term visual impact;
- carbon footprint considerations;
- air quality management;
- emergency management; and
- sterilisation of mineral resources.

7.2.2. ALTERNATIVE LOW GRADE ORE TREATMENT OPTIONS

Three options for treating the low grade ore are currently being investigated by means of site based testwork. These are outlined as follows:

- **Heap leaching of the ore after crushing**. In this scenario the ore is crushed to an appropriate size (around 6-12mm) and then stacked in heaps on top of an impermeable lining. Carbonate and bicarbonate solutions are sprinkled onto the heaps and allowed to permeate through the ore during which the uranium is leached. The solution is collected from under the heaps and recycled back until such time as the uranium in solution is at a suitable level for recovery by ion exchange resin. This loaded resin is then transported in sealed vessels to the main processing plant for the removal of uranium in the elution plant.

- **Ore sorting followed by Heap Leaching**. In this scenario the low grade ore is up-graded by using radiometric sorting to remove much of the waste material. This up-graded material is then subjected to heap leaching as described above, the difference being that the heaps can be smaller as a result of the reduced tonnage to be treated.

- **Ore sorting followed by Conventional Leaching**. In this scenario the upgraded material (after radiometric sorting) will be processed through the main processing plant.

7.2.3. THE "NO PROJECT" OPTION

The assessment of this option requires a comparison between the options of proceeding with the project with that of not proceeding with the project. The assessment of this option requires input from the investigations described in section 9 of this report so that the full extent of environmental, social and economic considerations can be taken into account.

7.3. ALTERNATIVE EPL CONVERSION OPTIONS

7.3.1. ALTERNATIVE MINE LAYOUTS

Alternative locations for future waste rock dumps are being considered.

The related selection criteria parameters to be applied may include:

- ecological;
- archaeology/heritage;
- groundwater;
- surface water;
- land use;
- land capability;

- long term visual impact;
- carbon footprint considerations;
- air quality management;
- emergency management; and
- sterilisation of mineral resources.

7.3.2. THE "NO PROJECT" OPTION

The assessment of this option requires a comparison between the options of proceeding with the project with that of not proceeding with the project. The assessment of this option requires input from the investigations described in section 9 of this report so that the full extent of environmental, social and economic considerations can be taken into account.

7.4. ALTERNATIVE WATER SUPPLY OPTIONS

Alternative routes for the new pipeline will not be considered as it is considered appropriate to follow the existing infrastructure corridor of the existing water pipeline and C28. It will, however, be necessary to consider whether the new pipeline is located on the southern or the northern side of the existing pipeline and whether it is appropriate for the entire section of pipeline for which LHM is responsible should be underground.

Another alternative is to construct the pipeline section along the C28 on the southern side of the road.

7.4.1. THE "NO PROJECT" OPTION

The assessment of this option requires a comparison between the options of proceeding with the project with that of not proceeding with the project.

7.5. ALTERNATIVE POWER SUPPLY OPTIONS

Alternative routes for power lines will not be considered as it is considered appropriate to follow the route of the existing power line as this is an established infrastructure corridor. It is not recommended to consider an entirely alternative line route to LHM, e.g. running along the C28 road up to the point where it follows the pipeline to the mine, as this will appreciably increase the line length and the line will not be able to transmit the requested demand by LHM.

7.5.1. THE "NO PROJECT" OPTION

The assessment of this option requires a comparison between the options of proceeding with the project with that of not proceeding with the project.

8. IDENTIFICATION OF POTENTIAL ENVIRONMENTAL IMPACTS

Potential impacts that have been identified during the internal screening exercise and the scoping process, in consultation with authorities, IAPs and specialists, are discussed under environmental component headings in this section. These discussions should be read with the corresponding descriptions of the current environment in section 4 of the scoping report.

The following sections also identify which environmental impacts relate to each component of the project and the need for further investigations as outlined in section 9 of the scoping report, as follows:

- Stage 4 expansion;
- EPL conversion to a ML;
- New water pipeline; and
- Upgraded power supply.

8.1. SOILS AND LAND CAPABILITY

Phase in which impact(s) may occur

Construction	Operational	Decommissioning	Closure

Topsoil is generally a resource of high value containing a gene bank of seeds of indigenous species. A loss of topsoil (through sterilisation, erosion or contamination) would generally result in a decrease in the rehabilitation and future land use potential of any land that is disturbed by the project. In particular, the soil crust is seen as important soil component in the desert environment.

Specialist investigations are required to accurately map the soils, assess this potential impact and compile an appropriate soils conservation programme. The additional work required to address this issue is described in section 9.19.1 of the scoping report.

It is likely that conservation/eco-tourism is the most significant natural use of the land. As the mine develops and disturbs additional land, the natural capability of the land can potentially be reduced. The additional work required to address this issue is described in section 9.1 of the scoping report.

It is considered that this impact applies principally to the conversion of the EPL to a ML and the location of new waste rock dumps. The expansion of the processing plant will take place on previously disturbed land and only minor impacts are anticipated during the construction and decommissioning stages of the water pipeline and power supply projects.

8.2. SURFACE WATER

8.2.1. ALTERING DRAINAGE PATTERNS

Phase in which impact(s) may occur

Construction	Operational	Decommissioning	Closure

Although rainfall is scarce in the region, significant rainfall events do occur and these events cause temporary flow of surface water. The proposed mine expansion and infrastructure could have a negative impact on drainage patterns but there are existing arrangements in place to manage these flows. The additional work required to address this issue is described in section 9.2 of the scoping report.

This impact is considered applicable to the stage 4 expansion and conversion of the EPL projects only.

8.2.2. CONTAMINATION OF SURFACE WATER

Phase in which impact(s) may occur

Construction	Operational	Decommissioning	Closure

The proposed projects will generally present a number of pollution sources that can have a negative impact on surface and sub-surface water quality if unmanaged. Typically, the following pollution sources exist: fuel and lubricant spillage, sewage, mineralised waste (tailings, heap leach facilities, waste rock dumps and stockpiles), dirty water circuit, sulphuric acid and process chemical spillage, non-mineralised waste (hazardous, general, radioactive), and erosion of particles from exposed soils in the form of suspended solids. The additional work required to address this issue is described in section 9.2 of the scoping report.

This impact is considered relevant to the stage 4 expansion and EPL conversion projects although there could be the potential for minor impacts during the construction and decommissioning phases of the water pipeline and power supply projects.

8.3. GROUNDWATER

8.3.1. LOWERING GROUNDWATER LEVELS

Phase in which impact(s) may occur

Construction	Operational	Decommissioning	Closure

Groundwater levels would be reduced on-site by pit dewatering. This impact could be significant given the reliance of people and ecosystems on groundwater. Assessing the significance of this impact requires input from the specialist investigation included in section 9.3 of the scoping report.

This impact is considered applicable to the stage 4 expansion and EPL conversion projects only.

8.3.2. CONTAMINATION OF GROUNDWATER

Phase in which impact(s) may occur

Construction	Operational	Decommissioning	Closure

Groundwater could become contaminated from number of sources as detailed in section 8.2.2. The additional work required to address this issue is included in section 9.3 of the scoping report.

This impact is considered applicable to the stage 4 expansion and the EPL conversion projects although there could be potential for minor impacts during the construction and decommissioning phases of the water pipeline and power supply projects.

8.4. BIODIVERSITY

Phase in which impact(s) may occur

Construction	Operational	Decommissioning	Closure

The proposed projects would cumulatively cause a loss of natural vegetation. This could lead to habitat fragmentation and degradation. It follows that the existence of and/or the habits of animal life (vertebrates and invertebrates) may also be impacted in a negative manner. Together, these impacts may cause a reduction in ecosystem functionality. The proposed powerlines could also impact on bird flight paths. The additional work required to address these issues is described in section 9.4 of the scoping report.

This impact is considered applicable to the stage 4 expansion, EPL conversion, water pipeline and power supply projects.

8.5. RADIOLOGICAL

Phase in which impact(s) may occur

Construction	Operational	Decommissioning	Closure

Radiological impacts are a subset of potential impacts on groundwater, surface water, air quality, soils ecology and third parties. In this regard, the existing activities and proposed projects have the potential to contaminate the environment with ionising radiation, radon gas and radionuclides. These could be dispersed by groundwater, surface water and air. The related impacts extend from human health impacts to ecosystem functionality. The additional work required to address this issue is outlined in section 9.5 of the scoping report.

This impact is considered applicable to the stage 4 expansion and EPL conversion projects only.

8.6. HERITAGE RESOURCES

Phase in which impact(s) may occur

Construction	Operational	Decommissioning	Closure

Heritage resources of varying significance have been identified in and around the project area. The impact of the proposed projects on heritage resources may depend on the selected project alternatives. Given this, the process of selecting project alternatives will include the findings of the specialist investigation. The additional work required to address this issue is described in section 9.6 of the scoping report.

This impact is considered applicable to the stage 4 expansion, EPL conversion, water pipeline and power supply projects.

8.7. TRAFFIC

Phase in which impact(s) may occur

Construction	Operational	Decommissioning	Closure

Traffic levels will increase as a result of the proposed projects and there may be a related safety impact on the existing road network. The additional work to address this issue is outlined in section 9.7 of the scoping report.

This impact is considered applicable to the stage 4 expansion and EPL conversion projects, although there may be scope for minor impacts during the construction and decommissioning phases of the water pipeline and power supply projects.

8.8. AIR QUALITY

Phase in which impact(s) may occur

Construction	Operational	Decommissioning	Closure

The proposed projects present a number of air pollution sources that can cumulatively have a negative impact on ambient air quality, ecosystem functionality and surrounding land uses. The additional work required to address this issue is described in section 9.8 of the scoping report.

This impact is considered applicable to the stage 4 expansion and the EPL conversion projects, although there may be scope for minor impacts during the construction and decommissioning phases of the water pipeline and power supply projects.

8.9. NOISE AND VIBRATION

Phase in which impact(s) may occur

Construction	Operational	Decommissioning	Closure

The proposed projects have the potential to generate noise and vibrations that could impact on surrounding areas, particularly at night when ambient noise levels are at their lowest. This can negatively impact on fauna and the wilderness experience that people expect when visiting the area from an eco-tourism or recreation perspective. The additional work required to address this issue is described in section 9.9 of the scoping report.

This impact is considered applicable to the stage 4 expansion and the EPL conversion projects.

8.10. LANDSCAPE AND VISUAL

Phase in which impact(s) may occur

Construction	Operational	Decommissioning	Closure

The NNNP has a special sense of place and is a unique and valuable visual resource. Negative visual impacts are expected (day and night) as a result of the visual intrusion by existing and proposed infrastructure in the project area, specifically when viewed from the surrounding tourist attractions such as Bloedkoppie. The additional work required to address this issue is outlined in section 9.10 of the scoping report.

This impact is considered applicable to the stage 4 expansion, EPL conversion, water pipeline and power supply projects.

8.11. TOPOGRAPHY

Phase in which impact(s) may occur

Construction	Operational	Decommissioning	Closure

The existing topography has been changed by current activities and further changes will occur if the project is implemented. Depending on the nature of the changes they can introduce hazardous excavations and infrastructure which pose dangers to animals and humans. The additional work required to address this issue is described in section 9.11 of the scoping report.

This impact is considered applicable to the stage 4 expansion and EPL conversion projects.

8.12. SOCIO-ECONOMIC

Phase in which impact(s) may occur

Construction	Operational	Decommissioning	Closure

The proposed projects could cumulatively have positive and/or negative impacts on the following:
the local and national economy,
infrastructure and services such as water, power, transport, housing, health, schools;
the tourism sector; and
integrated socio economic and environmental issues.

The additional work required to address these issues are outlined in section 9.12 of the scoping report.

This impact is considered applicable to the stage 4 expansion, EPL conversion, water pipeline and power supply projects.

9. TERMS OF REFERENCE FOR FURTHER INVESTIGATIONS

The proposed terms of reference for further investigations are discussed below. The investigations will cover construction, operation, decommissioning and closure phases where relevant and conceptual closure planning principles will be incorporated into the EIA and EMP reports.

9.1. SOILS AND LAND CAPABILITY

It is proposed that a detailed investigation be conducted by Earth Science Solutions, which will have the following objectives:

- to provide a baseline assessment of the soil, land use and land capability of the project areas not previously surveyed;
- to classify the different soil types and produce a soils distribution map;
- to confirm the natural land capabilities;
- to provide a profile of the soils, including the effective depth and occurrence of sub soils;
- to analyse properties and define characteristics of the soil such as nutrient content, chemistry, capability to support ecosystem functionality;
- to assess the impacts on soils and land capability; and
- to have input, together with Metago, other specialists and LHM, into project alternatives and mitigation measures going forward.

9.2. SURFACE WATER

It is proposed that a detailed investigation be conducted by Metago. The investigation will have the following objectives:

- to identify surface water resources;
- to identify catchment boundaries;
- to calculate rainfall intensities, runoff, flood events and related flood lines;
- to identify pollution sources, including run off from stockpiles and WRDs;
- to assess the cumulative impacts on surface water resources;
- to identify measures at LHM to ensure that clean and dirty storm water remains separate;
- to assess potential surface water pollution as a result of water run off from WRDs and stockpiles; and
- to have input, together with Metago, other specialists and LHM, into project alternatives and mitigation measures going forward.

9.3. GROUNDWATER

It is proposed that a detailed investigation be conducted by BIWAC. The investigation will have the following objectives:

- to provide baseline water depths and qualities in and around the proposed project site, including the changes since the mining operation commenced;
- to identify fractures, faults and other relevant geological features that may be relevant to assessing the impacts of the various pollution sources;
- to identify all current and future pollution sources – including characterisation of the pollution concentrations and seepage rates;
- to model contaminant transport;
- to model the impacts from pit dewatering;
- to assess the cumulative impacts on groundwater users and the ecosystem functionality; and
- to have input, together with Metago, other specialists and LHM, into project alternatives and the mitigation measures going forward.

9.4. BIODIVERSITY

The biodiversity assessment will be conducted by African Wilderness Restoration. The investigations will have the following objectives:

- to perform confirmatory baseline surveys of the additional areas that have not been surveyed to date;
- to merge the results of the previous and new baseline work;
- to produce updated sensitivity mapping of each identified vegetation community/habitat;
- to identify flora and fauna linked to each habitat and document possible occurrence of endemic, Red Data / threatened species, species with medicinal / cultural value and alien / invasive species.
- to rank each habitat based on conservation importance (in terms of national and provincial biodiversity priorities) and ecological sensitivity;
- to undertake identification of potential ecological impacts, with particular focus on:
    - the loss of general or sensitive habitats;
    - the potential loss of rare and threatened species;
    - the loss of open space;
    - the loss of natural migration corridors;
    - recommendations on management and mitigation measures (including opportunities and constraints) with regards to the construction and operation and future rehabilitation of the proposed development; and
- to have input, together with Metago, other specialists and LHM, into project alternatives and mitigation measures going forward.

9.5. RADIOLOGICAL

It is proposed that a detailed investigation be conducted by NECSA. The investigation will have the following objectives:

- identify and quantify the radiological sources associated with the proposed project;
- Provide radiological input into the models and apply the air and water studies being conducted by Airshed Planning Professionals and Biwac in the radiological assessment;
- from a public health viewpoint, a clear distinction must be made between the project area that is managed in accordance with occupational health and safety legislation, and the area beyond this defined boundary that falls under environmental and public exposure criteria;
- assess the cumulative public exposure radiological impacts for all relevant pathways; and
- to provide input, together with Metago, other specialists and LHM, into the mitigation measures going forward.

9.6. HERITAGE RESOURCES

It is proposed that a detailed investigation be conducted by Quaternary Research Services. The specialist investigation will have the following objectives:

- to survey the sections of the project area that have not been previously disturbed or investigated;
- to identify, classify and map all heritage resources in the proposed project area;
- to assess the impact on heritage resources; and
- to have input, together with Metago and LHM, into the project alternatives and the heritage mitigation measures going forward.

9.7. TRAFFIC

It is proposed that a qualitative traffic assessment conducted by Metago will have the following objectives:

- to establish existing baseline flows on the C28 and likely future increases as a result of the expansion project;
- to assess the related safety impacts; and
- to have input, together with Metago and LHM, into the project mitigation measures going forward.

9.8. AIR QUALITY

It is proposed that an air quality assessment be conducted by Airshed Planning Professionals. The investigation will have the following objectives:

- to quantify all existing and proposed emission sources (including point sources) in an emissions inventory;

- to model the cumulative spatial dispersion of emissions to air, applying the relevant meteorological conditions in and adjacent to the project site;
- to provide a first level risk assessment of the cumulative impacts on third parties;
- to provide input into improving the existing LHM air monitoring programme; and
- to have input, together with Metago, other specialists and LHM, into project alternatives and the mitigation measures going forward.

9.9. NOISE AND VIBRATION

It is proposed that Metago will:

- identify the noise and vibration sources associated with the existing activities and proposed project;
- qualitatively assess the cumulative noise and vibration impacts on sensitive surrounding areas; and
- have input, together with other specialists and LHM, into project alternatives and the mitigation measures going forward.

9.10. LANDSCAPE AND VISUAL

It is proposed that a detailed investigation be conducted by Newtown Landscape Architects. The investigation will have the following objectives:

- to define the visual resource and sense of place of the greater area;
- to identify the sensitive receptors/ lines of site;
- to determine the cumulative visual impact by simulating the key proposed infrastructure components of the project with those already in place or approved;
- to assess the cumulative visual impact; and
- to provide input, together with Metago, other specialists and LHM, into the visual management measures going forward.

9.11. TOPOGRAPHY

Impacts on topography will be assessed by Metago and mitigation measures provided in the EIA and EMP reports by Metago and LHM.

9.12. SOCIO ECONOMIC

It is proposed that a socio-economic investigation be conducted by Metago. The investigations will have the following objectives:

- to review existing social and economic data;
- to address the social and economic issues that were identified in the public participation process;

- to assess the potential positive and negative social and/or economic impacts; and
- to provide input, together with other specialists and LHM, into the mitigation measures going forward.

10. WAY FORWARD

10.1. WAY FORWARD FOR THE SCOPING REPORT

The way forward for the scoping phase is as follows:

- distribute the scoping report and a summary thereof for review by the IAPs and authorities by 8 April 2011;
- receive comments from IAPs and authorities on 8 May 2011 (at the end of the 30 day review period);
- submit the scoping report (with comments) to MET in May 2011; and
- receive comments from MET.

Review of scoping report by authorities and parastatals

Full copies of the draft scoping report will be distributed to the following authorities and parastatals:

- Ministry of Environment and Tourism – Parks and Wildlife (MET:P&W);
- Ministry of Mines and Energy (MME);
- Ministry of Agriculture, Water and Forestry (MWAF);
- National Heritage Council of Namibia (NHCN);
- Ministry of Health and Social Services (MHSS);
- Ministry of Labour and Social Welfare (MLSW);
- Ministry of Works, Transport and Communications; and
- Chamber of Mines (CoM);

Review of scoping report by IAPs

Full copies of the draft scoping report will be made available for public review at the following places:

- MET library and Namibian National Library in Windhoek;
- Walvis Bay public library;
- Swakopmund public library; and
- Langer Heinrich town office.

Electronic copies will be made available to IAPs on request (on a CD). A summary of the report has been compiled and distributed to all IAPs registered on the public involvement database.

IAPs comments on the scoping report should reach Metago by 8 May 2011. This gives IAPs 30 days to review the report. Comments should be made as follows:

- in writing directly to Metago via fax (+27 11-467 0978) and/or e-mail (natasha.daly@metago.co.za or brandon@metago.co.za);

OR

- in writing to LHMs environmental specialist – Werner Petrick (tel:064 410 6200).

All comments received from IAPs will be addressed in the EIA and EMP reports.

Review of scoping report by MET

In May 2011, following the IAP and other authority review process, one copy of the scoping report (with IAP and authority comments) will be forwarded to MET.

10.2. PLAN OF STUDY FOR EIA AND EMP

The plan of study for the EIA and EMP is set out below:

10.2.1. DESCRIPTION OF THE TASKS PLANNED FOR THE EIA PROCESS

An overview of the EIA process highlighting each phase and corresponding activities is provided in section 1.3.1. An outline of the planned investigations is included in section 9. The terms of reference of these tasks have been designed to address all the issues that have been identified in the scoping process and include the manner in which the tasks will be completed. The main component of the tasks is assessment work by specialists, Metago and the LHM project team. The outcome of this set of tasks includes specialist reports and the EIA and EMP reports.

10.2.2. PROPOSED METHOD FOR ASSESSING ENVIRONMENTAL ISSUES AND ALTERNATIVES

Assessment of environmental issues

The proposed method for the assessment of environmental issues is set out in Table 10-1. This assessment methodology enables the assessment of environmental issues including: cumulative impacts, the severity of impacts (including the nature of impacts), the extent of the impacts, the duration and reversibility of impacts, the probability of the impact occurring, and the degree to which the impacts can be mitigated.

TABLE 10-1: IMPACT ASSESSMENT METHOD

Note: Both the criteria used to assess the impacts and the method of determining the significance of the impacts is outlined in the following table. Part A provides the definition for determining impact consequence (combining severity, spatial scale and duration) and impact significance (the overall rating of the impact). Impact consequence and significance are determined from Part B and C. The interpretation of the impact significance is given in Part D.

PART A: DEFINITION AND CRITERIA*		
Definition of SIGNIFICANCE		**Significance = consequence x probability**
Definition of CONSEQUENCE		**Consequence is a function of severity, spatial extent and duration**
Criteria for ranking of the SEVERITY/NATURE of environmental	**H**	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action. Irreplaceable loss of resources.

impacts	**M**	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints. Noticeable loss of resources.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints. Limited loss of resources.
	L+	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.
Criteria for ranking the DURATION of impacts	**L**	Quickly reversible. Less than the project life. Short term
	M	Reversible over time. Life of the project. Medium term
	H	Permanent. Beyond closure. Long term.
Criteria for ranking the SPATIAL SCALE of impacts	**L**	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national

PART B: DETERMINING CONSEQUENCE

SEVERITY = L

DURATION	Long term	**H**	**Medium**	**Medium**	**Medium**
	Medium term	**M**	**Low**	**Low**	**Medium**
	Short term	**L**	**Low**	**Low**	**Medium**

SEVERITY = M

DURATION	Long term	**H**	**Medium**	**High**	**High**
	Medium term	**M**	**Medium**	**Medium**	**High**
	Short term	**L**	**Low**	**Medium**	**Medium**

SEVERITY = H

DURATION	Long term	**H**	**High**	**High**	**High**
	Medium term	**M**	**Medium**	**Medium**	**High**
	Short term	**L**	**Medium**	**Medium**	**High**
			L	**M**	**H**
			Localised Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional/ national
			SPATIAL SCALE		

PART C: DETERMINING SIGNIFICANCE

PROBABILITY (of exposure to impacts)	Definite/ Continuous	**H**	**Medium**	**Medium**	**High**
	Possible/ frequent	**M**	**Medium**	**Medium**	**High**
	Unlikely/ seldom	**L**	**Low**	**Low**	**Medium**
			L	**M**	**H**
			CONSEQUENCE		

PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	**Decision guideline**
High	It would influence the decision regardless of any possible mitigation.
Medium	It should have an influence on the decision unless it is mitigated.
Low	It will not have an influence on the decision.

***H = high, M= medium and L= low and + denotes a positive impact.**

All assessments will have regard to the findings and recommendations of the Strategic Environment Assessment for the Central Namib Uranium Rush.

Assessment of alternatives

Project alternatives have been discussed in section 7 of this report. The proposed methodology for the assessment of these alternatives is a relative comparison that also applies the assessment method that is set out in Table 10-1 (described above) to each of the listed assessment criteria, where possible.

10.2.3. INVOLVEMENT OF AUTHORITIES AND IAPS IN THE EIA AND EMP PHASE

Review of the EIA and EMP reports by authorities and IAPs

Copies of the EIA and EMP reports will be distributed for authority review in the same way as the scoping report. It is expected that the report will be distributed around July 2011.

Review of the EIA and EMP reports by MET

One copy of the EIA and EMP reports (with IAP and authority comments) will be forwarded by Metago to MET. It is expected that the report will be distributed to the MET around August 2011.

Information-sharing meetings

Public open days will be held during the EIA and EMP review period.

11. REFERENCES

Environmental Impact Assessment Report for the Proposed Expansion project at Langer Heinrich Mine, Project number L016-01, Metago Environmental Engineers (Pty) (Metago), 2009.

Environmental Impact Assessment Report for the Husab Mine Linear Infrastructure, Project number S039-01, Metago Environmental Engineers (Pty) (Metago), 2011.

Strategic Environmental Assessment for the central Namib Uranium Rush, prepared for the Ministry of Mines and Energy, Republic of Namibia, Southern African Institute for Environmental Assessment (SAIEA), 2010.

APPENDIX A: INFORMATION-SHARING WITH AUTHORITIES

Notification to MET.

APPENDIX B: PUBLIC INVOLVEMENT DATABASE

APPENDIX C: INFORMATION SHARING WITH IAPS

Background information document (BID).

Newspaper advertisements.

Site notices

Minutes of scoping meetings

Written comments

APPENDIX D: SUMMARY OF ISSUES RAISED BY AUTHORITIES AND IAPS

APPENDIX E: CURRICULUM VITAE

Metago Environmental Engineers (Pty) Ltd
Consulting Engineers and Scientists

RECORD OF REPORT DISTRIBUTION

Project Number:	EL016-03
Title:	ENVIRONMENTAL SCOPING REPORT FOR THE PROPOSED STAGE 4 EXPANSION PROJECT (INCLUDING THE CONVERSION OF EPL3500 TO A ML), A NEW (NAMWATER) WATER PIPELINE AND UPGRADING THE POWER SUPPLY (NAMPOWER) AT LANGER HEINRICH MINE
Report Number:	1
Proponent:	Langer Heinrich Uranium (Pty) Ltd

Name	Entity	Copy No.	Date issued	Issuer
Aune Andreas	MME	1		
Ben Beytell	MET:P&W	2		
Greg Christelis	MWAF	3		
Salomon April	NHCN	4		
Felix Musukubili	MLSW	5		
Axel Tibinyane	MHSS	6		
JC van Dyk/ Danie Louw	NamPower	7		
NP Du Plessis	NamWater	8		
Willy Kauaria	MWTC	9		
Wotan Swiggers	Chamber of Mines	10		
C/o reference librarian	MET library	11		
C/o reference librarian	Namibian National Library	12		
C/o reference librarian	Walvis Bay public library	13		
C/o reference librarian	Swakopmund public library	14		
Reception	Langer Heinrich Town Office	15		
Werner Petrick	Langer Heinrich Uranium	16		
Librarian	Metago	17		
Freddy Sikabongo	MET:DEA	18		

COPYRIGHT