ENVIRONMENTAL SCOPING ASSESSMENT

THE REMAINDER OF FARM GRUNEWALD NO. 135 IRRIGATION DEVELOPMENT

ENVIRONMENTAL SCOPING REPORT

AUGUST 2022

URBAN green cc
Town and Regional Planning Consultants
Environmental Management Consultants

PROJECT INFORMATION

Proponent:	**RADIT OSTRICH (PROPRIETARY) LIMITED**
Project Title:	**THE REMAINDER OF FARM GRUNEWALD NO. 135 IRRIGATION**
Type of Project:	**ENVIRONMENTAL SCOPING ASSESSMENT**
Project Location:	**STAMPRIET – HARDAP REGION (NAMIBIA)**
Project Number:	**APP-0010439**
Competent Authority:	**MINISTRY OF AGRICULTURE, WATER AND LAND REFORM** **PRIVATE BAG 13184** **WINDHOEK**
Approving Authority:	**MINISTRY OF ENVIRONMENT, FORESTRY AND TOURISM** **DEPARTMENT OF ENVIRONMENTAL AFFAIRS** **PRIVATE BAG 13306** **WINDHOEK** **NAMIBIA**
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LIST OF ACRONYMS

BID	Background Information Document
˚C	degrees Celsius
CBD	Convention on Biological Diversity
DEA	Directorate of Environmental Affairs
DSR	Draft Scoping Report
EAP	Environmental Assessment Practitioner
ECB	Electricity Control Board
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMA	Environmental Management Act
EMP	Environmental Management Plan
FSR	Final Scoping Report
Ha	Hectare
I&AP	Interested and Affected Parties
IGRAC	International Groundwater Resource Assessment Centre
IPM	Integrated Pest Management
IPP	Independent Power Producer
IWRM	Integrated Water Resource Management
kVA	Kilowatts Ampère
L	Litre
MAWLR	Ministry of Agriculture, Water and Land Reform
MET	Ministry of Environment and Tourism

MEFT	Ministry of Environment, Forestry and Tourism
NIRP	National Integrated Resource Plan
O&M	Operations and Maintenance
PPP	Public Participation Process
PV	Photovoltaic
ToR	Terms of Reference
SAB	Stampriet Artesian Basin

GLOSSARY OF TERMS

Alternatives - A possible course of action, in place of another, that would meet the same purpose and need but which would avoid or minimize negative impacts or enhance project benefits. These can include alternative locations/sites, routes, layouts, processes, designs, schedules and/or inputs. The “no-go” alternative constitutes the ‘without project’ option and provides a benchmark against which to evaluate changes; development should result in net benefit to society and should avoid undesirable negative impacts.

Assessment - The process of collecting, organising, analysing, interpreting and communicating information relevant to decision making.

Aquifer - An underground layer of water-bearing permeable rock, rock fractures or unconsolidated materials.

Artesian water – Water that is confined in an aquifer between impermeable beds and is under pressure, like water in a pipe. When a well or fracture intersects the aquifer, water rises in the opening, producing a flowing well or an artesian spring.

Cation – An atom with more protons than electrons, consequently giving it a net positive charge. For a cation to form, one or more electrons must be lost, typically pulled away by atoms with a stronger affinity for them.

Conductance - the expression for the ease of the passing of the electrons.

Critically Endangered (IUCN) - A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V of the

IUCN Red List Categories and Criteria[1]), and it is therefore considered to be facing an extremely high risk of extinction in the wild.

Cumulative Impacts - In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Endangered (IUCN) - A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V of the IUCN Red List Categories and Criteria[2]), and it is therefore considered to be facing a very high risk of extinction in the wild.

Environment - As defined in the Environmental Assessment Policy and Environmental Management Act - "land, water and air; all organic and inorganic matter and living organisms as well as biological diversity; the interacting natural systems that include components referred to in sub-paragraphs, the human environment insofar as it represents archaeological, aesthetic, cultural, historic, economic, paleontological or social values".

Environmental Impact Assessment (EIA) - The process of examining the environmental effects of a development as prescribed by the Environmental Impact Assessment Regulations (GN. No. 30 of 2012) for activities listed as List of Activities which may not be undertaken without an Environmental Clearance Certificate from the Environmental Commissioner (GN. No. 29 of 2012).

Environmental Management Plan (EMP) - A working document on environmental and socioeconomic mitigation measures, which must be implemented by several responsible parties during all the phases of the proposed project.

Erosion - The detachment, transport and deposition of soil particles by water, wind, ice and gravity.

Evaluation – the process of ascertaining the relative importance/significance of information, in light of people's values, preference and judgements in order to make a decision.

Hazard - Anything that has the potential to cause damage to life, property and/or the environment. The hazard of a particular material or installation is constant; that is, it would present the same hazard wherever it was present.

Interested and Affected Party (I&AP) - any person, group of persons or organisation interested in, or affected by an activity; and any organ of state that may have jurisdiction over any aspect of the activity.

Mitigate - The implementation of practical measures to reduce adverse impacts.

Protected - Protected under Namibian legislation.

[1] Available at http://s3.amazonaws.com/iucnredlist-newcms/staging/public/attachments/3097/redlist_cats_crit_en.pdf

[2] Available at http://s3.amazonaws.com/iucnredlist-newcms/staging/public/attachments/3097/redlist_cats_crit_en.pdf

Proponent - Any person who has submitted or intends to submit an application for an authorisation, as legislated by the Environmental Management Act no. 7 of 2007, to undertake an activity or activities identified as a listed activity or listed activities; or in any other notice published by the Minister or Ministry of Environment, Forestry & Tourism.

Public - Citizens who have diverse cultural, educational, political and socio-economic characteristics. The public is not a homogeneous and unified group of people with a set of agreed common interests and aims. There is no single public. There are a number of publics, some of whom may emerge at any time during the process depending on their particular concerns and the issues involved.

Public consultation - The process of engagement between stakeholders (the proponent, authorities and I&APs) during the planning, assessment, implementation and/or management of proposals or activities. The level of stakeholder engagement varies depending on the nature of the proposal or activity as well as the level of commitment by stakeholders to the process. Stakeholder engagement can therefore be described by a spectrum or continuum of increasing levels of engagement in the decision-making process. The term is considered to be more appropriate than the term "public participation".

The term therefore includes the proponent, authorities (both the lead authority and other authorities) and all interested and affected parties (I&APs). The principle that environmental consultants and stakeholder engagement practitioners should be independent and unbiased excludes these groups from being considered stakeholders.

IUCN Red List - The IUCN Red List of Threatened Species™ is widely recognised as a comprehensive, objective global approach for evaluating the conservation status of plant and animal species.

Salinisation - Accumulation of water-soluble salts in soil to a level where agricultural production and ecosystem quality are negatively affected.

Scoping Process - Process of identifying: issues that will be relevant for consideration of the application; the potential environmental impacts of the proposed activity; and alternatives to the proposed activity that are feasible and reasonable.

Significant Effect/Impact - Means an impact that by its magnitude, duration, or probability of occurrence may have a notable effect on one or more aspects of the environment.

Sustainable Development – Development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs and aspirations.

Species of Special Concern - Those species listed in the Endangered, Threatened, Rare, Indeterminate, or Monitoring categories of the South African Red Data Books, and/or species listed in Globally Near Threatened, Nationally Threatened or Nationally Near Threatened categories (Barnes, 1998).

Sub-artesian - Water that rises naturally in a well to a height appreciably above that of the surrounding water table, but does not flow out of the well.

Topsoil - The top 150 mm of soil (topsoil) and root material of cleared vegetation.

Vulnerable - A taxon is vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V of the IUCN Red List Categories and Criteria[3]), and it is therefore considered to be facing a high risk of extinction in the wild.

[3] Available at http://s3.amazonaws.com/iucnredlist-newcms/staging/public/attachments/3097/redlist_cats_crit_en.pdf

EXECUTIVE SUMMARY

The Farm Owner of the Remainder of Farm Grunewald No. 135, is of the intention to increase water abstraction in the Stampriet Artesian Basin (SAB) near Stampriet, Hardap Region, Namibia. Four centre pivot irrigation fields (two of 16 ha and two of 20 ha each) were developed and cultivated from two boreholes (WW200904 and WW203399) that have an abstraction Permit Number 10785. To cultivate wheat and maize rotationally on all four irrigation fields, increased water abstraction from two additional boreholes (WW204682 and WW204683) is required. These additional two boreholes are registered with the Ministry of Agriculture, Water and Land Reform and records of their completion reports exist there.

Ground water abstraction for commercial purposes and development of irrigation schemes for agriculture are listed activities (GN. No. 29 of 2012). In accordance with the Environmental Management Act, (Act No. 7 of 2007) and within the framework of the Environmental Impact Assessment Regulations (2012), Urban Green cc (EAP) has been appointed by Radit Ostrich (Pty) Ltd (Proponent) to undertake an Environmental Scoping Assessment and apply for an Environmental Clearance Certificate for the irrigation development.

The Department of Water Affairs and Forestry for Namibia (DWAF) within the Namibian Ministry of Agriculture, Water and Land Reform has a Geohydrology Division, which is responsible for all water resource development projects in the country, including irrigation planning and development. Groundwater extraction and management in Namibia is controlled through a permit system as well as the activities of local water user committees. In view of concerns on the part of both local water users and the government about possible over-extraction of water in the SAB in Namibia, an aquifer management committee, the Stampriet Basin Water Committee**,** was formed to assist the Department of Water Affairs and Forestry in monitoring water utilization in the basin.

The Stampriet Artesian Basin (SAB) is shared by Namibia, Botswana and South Africa. The presence of fresh water is of special value in the very arid environment where brackish and saline groundwater frequently occur. Although all three countries share the SAB, only Namibia makes significant use of its groundwater. The natural conditions, i.e. groundwater occurrence and quality are more favourable on the Namibian side.

The four sites for the irrigation fields were selected in two consecutive “streets” between the longitudinal dunes where slope and soil composition are more suitable. The sites are also located in the north-eastern part of the Remainder of Farm Grunewald No. 135 close to the available boreholes and homestead.

Centre pivot irrigation systems have been installed, which are highly efficient in water use and fertilizer can also be administered through it to ensure the correct amount for maximum absorption and least wastage. Power for the centre pivots is sourced from the NamPower grid and a solar system that can generate 50 kVA exists near the homestead to supplement electricity supply. Food crops, i.e. wheat and maize will be produced to contribute positively towards food security in Namibia.

The physical environment is typical of the *Southern Kalahari* biome on Kalahari sandveld found within the south-eastern parts of Namibia. Low vegetated dunes run in a north-west to south-east direction with flat areas ("streets") in between dunes. The farm falls within the Kalahari Group with Kalahari Sand Rock Type.

The soil type in the general area is *Ferralic Arenosols*, but the soil of the interdune valleys ("streets") in the Kalahari can be described as *Arenic Calcisols*. *Calcisols* can be productive under irrigation with proper management practices for fertilization and to prevent salinisation and erosion.

Plant diversity is low with an estimate of between 50-99 higher plant species recorded. It is estimated that at least 45 reptile, 3 amphibian, 47 mammal and 131 bird species are known to or expected to occur in the general area. Hardap Recreation Resort is approximately 60 km to the west of the Project Site and is the nearest protected area where all of the species could be found and protected.

The larger area between Stampriet and Gochas consist of freehold farm land and the Remainder of Farm Grunewald No. 135 is zoned for agricultural use. The Southern Kalahari is suitable for livestock farming and sheep farming is predominant in the area. Farms along the Auob River has been developed for small scale irrigation farming, due to the availability of underground water throughout the year. Special measures are required to enhance production under the challenging environmental circumstances.

The visual aesthetics and sense of place in the natural environment is typical *Kalahari* veld with red sand, waving grass, shrubs, Shepherd and Camelthorn trees. The longitudinal dune system will hide irrigation fields within the valleys between dunes.

The Hardap Region is located in the southern parts of Namibia and have a population size of 79 507 with an annual growth rate of 1.5 % from 2001 – 2011. Approximately 35,000 people live in the Stampriet Artesian Basin (SAB) in Namibia. They extract groundwater from aquifers in the SAB for their domestic water supply, their livestock production and for irrigation. The great majority of the local population is dependent on farming for its livelihood.

Public consultation for the purposes of this project was done as prescribed by Regulations 21 to 24 of the Environmental Impact Assessment Regulations (GN. 30 of 2012). Engagement with the public and authorities as part of the first round of public consultation commenced on the 06th of July 2022 and concluded on the 27th of July 2022. During the first round of consultation, I&APs and authorities were given an opportunity to register and submit comments and/or concerns on the proposed project (Chapter 6). No concerns were raised.

Given the nature of the activities associated with the increase water abstraction and the receiving environment, a Geohydrological Baseline Assessment (Appendix D) and an Ecological Baseline Assessment (Chapter 5) were carried out as part of the scoping stage. These assessments identified the following issues:

- Possible reduction of groundwater availability due to over-abstraction;

- Possible pollution of the groundwater resources;
- Loss of Biodiversity and Habitat Destruction; and
- Soil degradation.

Other issues identified as part of the scoping assessment are -

- Positive impact on food security;
- Positive impact on job creation for Witkrans community.

These issues are discussed in detail and mitigation measures and recommendations are provided in Chapter 7 of this report. It is the conclusion of the Environmental Scoping Assessment that this project has the potential to contribute positively to the country's food security in a manner that compliments the Namibia Agriculture Policy 2015. However, Namibia's arid and unpredictable climate, limited water sources, soils with inherently low fertility and poor physical properties are major constraints to limit agricultural development, especially crop farming. Natural vegetation is adapted to local soil conditions, but crops perform poorly in these marginal soils and this is reflected in low yields.

That said, the scoping study indicated that the soil type of the interdune valleys that occur in the SAB area have the potential to overcome the general difficulties experienced in crop farming in other areas of Namibia. Commercial high-input farming technologies can further help overcome these limitations. Extensive capital investment has been untaken on the Remainder of Farm Grunewald No.135 to overcome the environmental constraints. With the mitigation measures as discussed in Chapter 7.4, the Project can minimize negative environmental impacts and with rigorous monitoring of groundwater quantity and quality by the Proponent, the Stampriet Water Basin Committee and the Ministry of Agriculture, Water and Land Reform, impacts on groundwater of the SAB can be detected and addressed.

Given the above it is recommended that expansion of irrigation development and increased groundwater abstraction from the SAB on the Remainder of Farm Grunewald No. 135 be done with rigorous monitoring of groundwater, soil and financing. This must be undertaken by the Proponent and monitored by the Stampriet Water Basin Committee and the Ministry of Agriculture, Water and Land Reform. All potential impacts identified in this study on groundwater and soil as well as other impacts that might arise during implementation must be identified in time and addressed in an effective manner. It is the opinion of the EAP that further information is not required from a full EIA.

Based on the information presented in this scoping report, the Environmental Assessment Practitioner is of the opinion that the immediate and larger environment will not be significantly impacted if the above recommendations as proposed in this report are implemented and monitored, and responsible environmental practises are applied by the Proponent.

1 INTRODUCTION TO THE PROJECT AND THIS REPORT

This chapter of the report provides a background and motivation to the proposed project; the study's terms of reference; study approach and methodology, purpose of this report; the assumptions and limitations of the study; and an outline of the remainder of the report.

1.1 PROPOSED PROJECT

The Farm Owner of the Remainder of Farm Grunewald No. 135, is of the intention to increase water abstraction in the Stampriet Artesian Basin (SAB) near Stampriet, Hardap Region, Namibia.

The farm is generally used for livestock production on natural vegetation. Four centre pivot irrigation fields (two of 16 ha and two of 20 ha each) were developed and cultivated from two boreholes (WW200904 and WW203399) that have an abstraction Permit Number 10785. The use of another two additional existing boreholes (WW204682 and WW204683) will be required for increase water abstraction. These additional two boreholes are registered with the Ministry of Agriculture, Water and Land Reform and records of their completion reports exist there. Refer to Appendix 2 of the Geohydrology Report in Appendix D.

The abstraction of ground or surface water for industrial or commercial purposes and irrigation schemes for agriculture require an Environmental Clearance Certificate (ECC) before commencing [Section 27(3) of the Environmental Management Act, No. 7 of 2007]. To this effect Radit Ostrich (Pty) Ltd (the Proponent) would like to apply with the Ministry of Agriculture, Water and Land Reform for increase water abstraction from two existing boreholes on the farm.

In accordance with the Environmental Management Act, (Act No. 7 of 2007) and within the framework of the Environmental Impact Assessment Regulations (2012), Urban Green cc (EAP) has been appointed by the Proponent to undertake an Environmental Scoping Assessment and apply for an Environmental Clearance Certificate for the irrigation development.

1.2 LOCALITY

The Remainder of Farm Grunewald No. 135 is located approximately 18 km south, south-east of Stampriet in the Hardap Region of Namibia. It can be reached along the C15 Main Road that runs between Strampriet and Gochas.

Fig. 1.2 – *Locality Map of the Remainder of Farm Grunewald No. 135*

1.3 NEED FOR AND DESIRABILITY OF THE PROJECT

The Agriculture sector in Namibia plays an important role in the economy as it supports the livelihoods and create employment for the majority of the population. In 2012, the sector provided more than 172 530 jobs in the subsistence and commercial sectors, making it the most employment intensive sector in the country. About 70 % of Namibia's population is dependent directly or indirectly on it for a livelihood. (*MAWF, 2015*)

This project is in line with the goals of the Namibia Agriculture Policy 2015 to increase agricultural production and productivity, to accelerate its contribution to National Growth Domestic Product and to develop the agriculture sector across the value chain. The proposed expansion of agronomic activities will contribute to the local market by delivering wheat and maize to Namib Mills in Mariental.

1.4 STUDY TERMS OF REFERENCE

No formal Terms of Reference (ToR) were provided, but rather were inferred from the requirements of the applicable legislation namely the Environmental Impact Assessment Regulations (Government Notice No. 30 of 2012), to enable an application for an ECC with the Environmental Commissioner, as required by Section 27(3) of the Environmental Management Act (No. 7 of 2007).

The purpose of this Study is to apply for an ECC only. All other permits and/or licenses (see section 3.4) required for the operation of the proposed project still needs to be applied for by the Proponent.

1.5 STUDY APPROACH AND METHODS

This EA process was carried out in accordance with provisions for EA, as prescribed by the Environmental Impact Assessment Regulations (GN. No. 30 of 2012), provided for by Section 56 of the Environmental Management Act (No. 7 of 2007).

The study's approach and methods were guided by the Terms of Reference (Section 1.4) and the relevant legislation (Chapter 3).

The EA process is a planning, design and decision-making tool used to inform the relevant authorities and Proponent on what the consequences of their decisions will be in biophysical and social terms. As such, it identifies potential impacts (negative and positive) that the Project may have on the natural and social environments; as well as identifying potential opportunities and constraints the natural and social environment may pose to the Project.

The steps followed as part of this EA process, are (i) registration of application for an ECC, and (ii) execution of a scoping assessment (content of this report). A flowchart indicating the process being followed is presented by Figure 1.5 below.

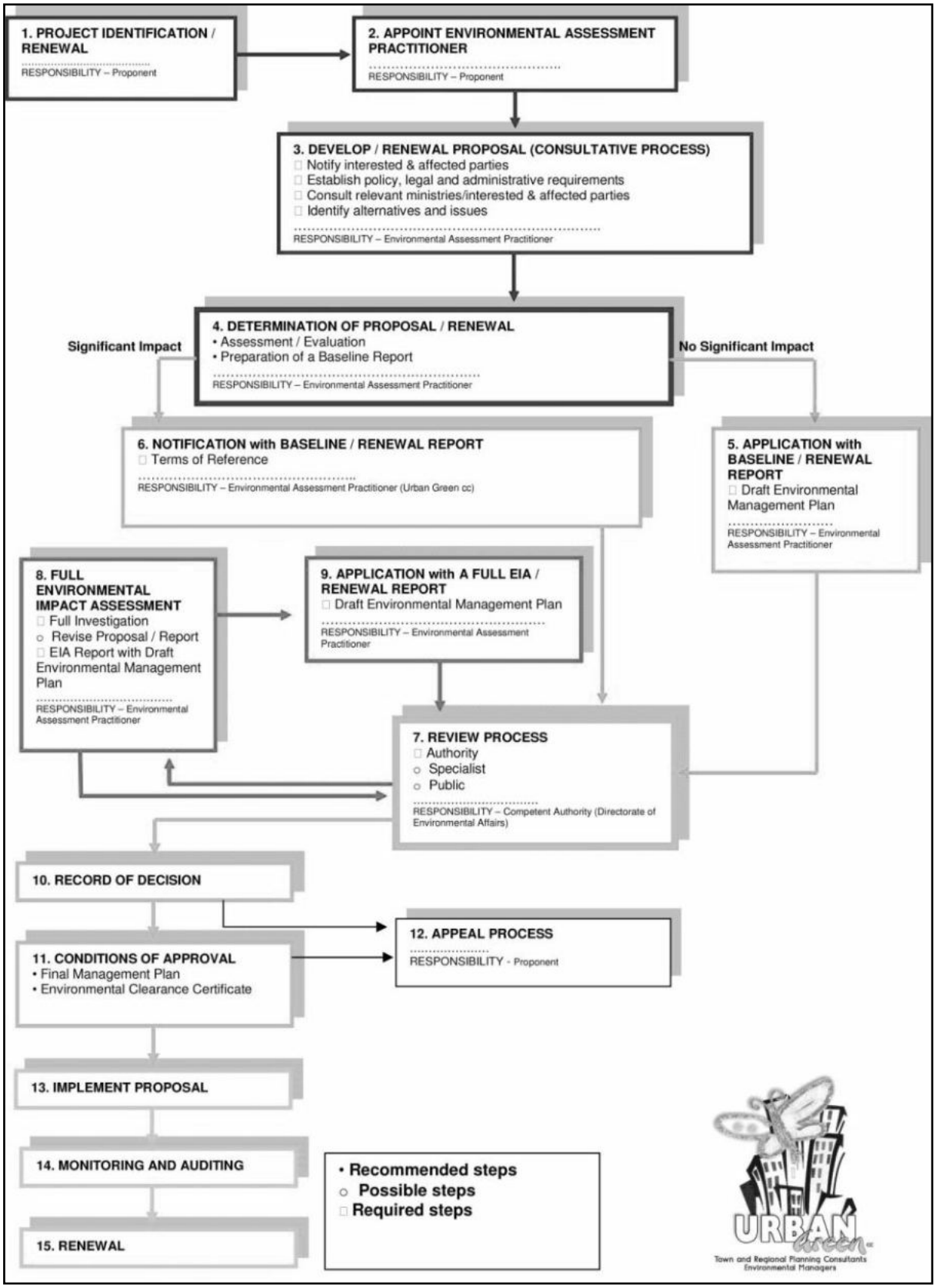

Figure 1.5: *Diagrammatic representation of Namibia's Environmental Assessment process*

1.5.1 REGISTRATION OF APPLICATION FOR ECC

The first step followed as part of this EA process was to identify the listed activities potentially associated with the Project, as stipulated in the '*List of Activities that may not be undertaken without an Environmental Clearance Certificate'* (GN. No. 29 of 2012) and register the mentioned with the Office of the Environmental Commissioner.

The listed activities for which an ECC is required are:

"WATER RESOURCE DEVELOPMENTS"

The construction of facilities for -

8.1 The abstraction of ground or surface water for industrial or commercial purposes.

8.7 Irrigation schemes for agriculture excluding domestic irrigation.

In accordance with Section 32 of the EMA, applications for an ECC should be submitted with the relevant Competent Authority, which for this Project was identified to be the Ministry of Environment, Forestry and Tourism and the Ministry of Agriculture, Water and Land Reform. The Ministry of Agriculture, Water and Land Reform was informed in writing on 6 July 2022 of the proponent's intention to apply for an ECC with the Environmental Commissioner, with a copy of the application submitted with the office of the Environmental Commissioner with the Ministry of Environment, Forestry and Tourism (Appendix A).

1.5.2 SCOPING STAGE AIMS

The next step followed as part of this EA process was the scoping assessment. The identification of potential impacts and their significance, as well as public consultation (as prescribed by Regulation 21 to 24 of the EIA Regulations (GN. No. 30 of 2012) are important elements of the scoping stage. Hence, during the scoping stage issues/impacts that are likely to be significant are identified and those that are less significant are evaluated and if warranted, eliminated.

1.5.3 SCOPING STAGE METHOD

The method followed during the scoping stage was as per the requirements set by the Environmental Impact Assessment Regulations (GN. No. 30 of 2012), which included –

- Giving notice to all potential interested and affected parties (I&APs) of the application (ECC application);
- Public consultation as per Regulation 21 which included the -
  - Opening and maintaining a register of all I&APs;
  - Receiving and recording of all comments and representations received from I&APs following the public consultation processes;
- Preparing a scoping report by subjecting the proposed application to scoping by -

- Assessing the potential effects of the proposed listed activities on the environment (specialist studies also formed part of this stage);
- Assessing whether and to what extent the potential effects identified can be mitigated and whether there are any significant issues and effects that require further investigation;
- Identifying feasible alternatives related to the project;
- Setting the Terms of Reference for further investigations (if required);
- Informing I&APs of the way forward in the EA process;
- Ensuring informed, transparent and accountable decision-making by the relevant authorities; and
- Inviting all registered I&APs to comment on the scoping report.

- Informing all registered I&APs of the decision of the office of the Environmental Commissioner.

1.5.4 SPECIALIST STUDIES

Given the nature of the activities associated with the increase water abstraction and the receiving environment, a Geohydrology Baseline Assessment (attached as Appendix D) and an Ecological Baseline Assessment (see Chapter 5) were conducted.

1.5.5 ISSUES AND CONCERNS RAISED, IDENTIFIED AND ASSESSED

Some of the typical environmental issues pertaining to irrigated agricultural development include:

- watershed degradation;
- encroachment of unique ecosystems and historical /cultural sites;
- biodiversity loss/change;
- proliferation of invertebrate and vertebrate pests and disease carriers;
- soil erosion;
- soil fertility;
- sedimentation;
- surface and groundwater water hydrology (level, quantity, quality);
- seepage;
- waterlogging; and
- eutrophication.

During the screening stage, the following issues for further investigation were identified:

- Water usage and decline in ground water levels of the Stampriet Artesian Basin;
- Groundwater pollution;
- Loss of biodiversity;

- Dust pollution; and
- Soil degradation.

No issues or concerns were raised during the 1st round of public consultation that was undertaken from 6 -27 July 2022 (Refer to Chapter 6 and Appendix F).

As a result, a Geohydrological Baseline Assessment (attached as Appendix D) and an Ecological Baseline Assessment (see Chapter 5) were carried out as part of the scoping stage. These assessments confirmed and highlighted the following issues:

- Possible reduction of groundwater availability due to over-abstraction;
- Possible pollution of the groundwater resources;
- Loss of Biodiversity and Habitat Destruction; and
- Soil degradation.

Other issues identified as part of the scoping assessment are -

- Positive impact on food security;
- Positive impact on job creation for Witkrans community.

These issues are discussed in detail and mitigation measures and recommendations are provided in Chapter 7 of this report.

1.6 PURPOSE OF THIS FINAL SCOPING REPORT

This Final Scoping Report (FSR) has been compiled as part of an assessment that has been undertaken for increase water abstraction from the Stampriet Artesian Basin (SAB) on the Remainder of Farm Grunewald No. 135. This FSR summarises the process followed to date, provides a description of the Project and addresses the issues raised by Interested and Affected Parties (I&APs). It further provides an assessment of the impacts of the proposed Project along with mitigation measures and recommendations.

The Draft version of this Report was made available for public review and comment from 10 to 17 August 2022, as required by section 23 of the Environmental Impact Assessment Regulations (GN. No. 30 of 2012). Comments received were included into this Final Scoping Report submitted with the Ministry of Agriculture, Water and Land Reform (i.e. Competent Authority) and the Ministry of Environment, Forestry and Tourism, Directorate of Environmental Affairs (i.e. Approving Authority) with for decision-making.

After the DEA has reached a decision, all registered I&APs on the project database will be notified of the decision and the requirements of the statutory Appeal Period.

1.7 STUDY ASSUMPTIONS AND LIMITATIONS

In undertaking the EA and compiling the scoping report, the following assumptions and limitations apply:

- It is assumed that all the information provided by the proponent, appointed consultants and authorities consulted, is accurate and that those aforementioned have disclosed all necessary information available;
- It is assumed that all permit or licence requirements, other than the ECC, associated with the Project will be addressed as separate investigations and are not included in this EA process;
- It is assumed that there will be no significant changes to the project (see Chapter 4) or the affected environment (see Chapter 5) between the compilation of this report and implementation of the project that could substantially influence findings, recommendations with respect to mitigation and management, etc.;
- The EA process involved the assessment of impacts on the current conservation value of affected land and not on either the historic or potential future conservation value; and
- The assessment is based on the prevailing environmental (social and biophysical) and legislative context at the time of writing this report.

1.8 STRUCTURE OF THE REPORT

This report consists of nine chapters as outlined below.

Table 1.8 *– Structure of the Report*

SECTION	CONTENTS
Executive Summary	**Executive Summary** Provides an overview of the main findings of the Study.
Chapter 1	**Introduction to the Project and this Report** Provides a background and motivation to the proposed development; Terms of Reference; Study approach and methods; the study assumptions and limitations; outlines the purpose, goals and structure of the Report. It also describes the procedure for submitting comment on the Study.
Chapter 2	**Project Team and Expertise** Provides an overview of the role-players participating in the project as well as their experiences.
Chapter 3	**Legislation Applicable to the EA & Project** Provides an overview of the key legislation having relevance to the environmental assessment and activities associated with the proposed project.

Chapter 4	**Description of the Proposed Project** Provides a description of the physical appearance of the proposed project, the technology intended to be used, service infrastructure and operation activities.
Chapter 5	**The Affected Environment** Describes the details pertaining to the site, the existing physical, biophysical, land use and socio-economic environment of the study area.
Chapter 6	**Details of the Public Participation Process** Explains in detail the entire public consultation process followed as part of this study. Feedback received from registered Interested and Affected Parties and Stakeholders are listed as well.
Chapter 7	**Assessment of Potential Impacts** Describes and assesses the potential impacts of the proposed project. Mitigation measures relevant to the increased abstraction as appropriate are recommended.
Chapter 8	**Conclusions and Recommendations** Provides conclusions to the impact assessment and evaluates the overall suitability of the proposed expansion. Recommendations for implementation are also provided, as appropriate.
Chapter 9	**References** Provides information on the information referenced in the document.

2 PROJECT TEAM

This chapter of the report provides an introduction and overview of the various role players on this Project and environmental assessment study, as well as the expertise and qualifications of the environmental consultants and specialists.

2.1 ROLE PLAYERS

The role players in this project are set out in Table 2.1.

Table 2.1 *- The role players*

ORGANISATION	PROJECT ROLE
Ministry of Agriculture, Water and Land Reform	Competent Authority
Ministry of Environment, Forestry and Tourism	Authorising Authority
Directorate of Environmental Affairs	Decision-making authority for environmental authorization
Radit Ostrich (Proprietary) Limited	Proponent
Urban Green cc – Brand van Zyl	Independent Environmental Consultant (EAP)
Christina Tromp	Independent Environmental Consultant (EAP) and Ecologist
Otto van Vuuren	Geohydrologist

2.1.1 PROPONENT

The Proponent is Radit Ostrich (Proprietary) Limited who is the current owner of the Remainder of Farm Grunewald No. 135 and who will be responsible for the irrigation expansion development.

2.1.2 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Urban Green Consultants cc is a multi-disciplinary consultancy, which has been offering innovative and environmentally sound solutions for over 17 years to private-, public- and NGO clients in Namibia. They offer professional services in Environmental Management, and Town and Regional Planning, as well as advise and products in the water and wastewater treatment industry. Urban Green compiled the following project team for the EIA:

2.2 EXPERTISE OF THE EAP AND EIA SPECIALISTS

The qualifications and expertise of the environmental consultants and specialists are set out in Table 2.2 below and CV's appear in Appendix B.

Table 2.2 – *Qualifications and expertise of the environmental consultants*

NAME	**Mr Brand van Zyl**
RESPONSIBILITY ON THE PROJECT	EAP Public consultation, impact assessment and mitigation formulation, reporting and application for Environmental Clearance
QUALIFICATIONS	M. Degree in Environmental Management; M. Degree Town and Regional Planning; Bachelor of Arts Urban Geography
PROFESSIONAL REGISTRATION	Namibian Council for Town and Regional Planners Member of the Green Building Council of South Africa
EXPERIENCE IN YEARS	17
EXPERIENCE	Brand van Zyl has been involved in various Environmental Impact Assessment studies throughout Namibia and of different kind.
NAME	**Christina Tromp**
RESPONSIBILITY ON THE PROJECT	EAP / Ecologist Impact assessment and mitigation formulation, reporting and application for Environmental Clearance
QUALIFICATIONS	M. Phil Degree in Environmental Management and Bachelor of Science Degree in Agriculture, majoring in Nature Conservation
PROFESSIONAL REGISTRATION	Environmental Assessment Professional Association of Namibia (EAPAN)
EXPERIENCE IN YEARS	13
EXPERIENCE	Christina Tromp is an educated environmentalist with work experience in the Namibian environment in Rural Development, Agricultural and Environmental sectors. She is a registered Environmental Assessment Practitioner. Her work experience was gathered in most regions of Namibia.
NAME	**Mr Otto van Vuuren**
RESPONSIBILITY ON THE PROJECT	Assessing the pumping test report by NamWater for the geohydrological input into the Environmental Impact Assessment
QUALIFICATIONS	B. Sc (Geological sciences); B.Sc (Hons) (Hydrology and Geohydrology)
PROFESSIONAL REGISTRATION	Awaiting registration as Senior Geoscientist at the Geosciences Council of Namibia. (Application submitted)
EXPERIENCE IN YEARS	35
EXPERIENCE	Otto van Vuuren has more than 30 years' experience in the groundwater sector and related services in Namibia.

3 LEGISLATION APPLICABLE TO THE STUDY AND PROPOSED PROJECT

For environmental protection and sustainable renewable resource management to the benefit of all, legislation from different spheres under control of different ministries have been adopted and enacted by Parliament. In support to the goal of sustainable renewable resource management, various international treaties and conventions have also been agreed to by Namibia.

There are several sectoral laws that fall under the general rubric of environmental laws. Sectoral laws are generally specific and apply to sectors such as water, agriculture, mining, forestry and so forth. Any development, such as this, is expected to have certain impacts and would therefore have to comply with some or other legislative requirement/s before commencement.

This chapter provides an overview to the legislation that is applicable to both the assessment process and the various activities making up the irrigation expansion development. It is accordingly divided into: (i) the legal framework for environmental management in Namibia; (ii) national sectoral legislative requirements applicable to the activities of the project; and (iii) international treaties and conventions and (iv) other relevant agreements and approvals required for the commencement of the project.

3.1 NAMIBIAN LEGAL FRAMEWORK FOR EIA

Several Namibian legislation and policies have environmental considerations with respect to the proposed Project.

The instruments accounting for the legal framework for conducting an environmental assessment is listed in Table 3.1 below.

Table 3.1 *– Namibian legislation applicable to the EA process*

STATUTE	PROVISIONS	DEVELOPMENT IMPLICATIONS
ENVIRONMENTAL ASSESSMENT LEGAL FRAMEWORK		
The Namibian Constitution (1990)	Article 95 (1) states that "*the State shall actively promote and maintain the welfare of the people by adopting, inter alia, policies aimed at… maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of natural resources on a sustainable basis"* Article 100 stipulates that all natural	The Project should support the provisions of the Namibian Constitution

STATUTE	PROVISIONS	DEVELOPMENT IMPLICATIONS
	resources are vested in the state, unless otherwise legally owned. The use of such resources is only allowed within reasonable limits and beyond such limits, permission should be obtained from a competent authority responsible for the use and governance of the concerned natural resources.	
Environmental Management Act (No 7 of 2007)	Section 3(2) of the EMA provides a set of principles that give effect to the provisions of the Namibian Constitution for integrated environmental management. Section 27(3) stipulates that no party, whether private or governmental, can conduct a listed activity without an ECC obtained from the Environmental Commissioner. Section 40(1) stipulates that an ECC remains valid for a period not exceeding three years, subject to cancellation or suspension.	The Project should adhere to the principles provided in the EMA. An ECC should be obtained for the Project. The Proponent should renew the ECC (if granted) every three years.
EIA Regulations 2012 (GG No. 4878 GN No. 29 and 30)	Provides for the process to be followed in undertaking an environmental assessment, stipulating particular requirements with regards to public consultation, the identification of impacts and establishing the significance thereof, as well as the content of an environmental scoping report. Of particular interest is the transfer of an ECC, which is regulated by section 20 of the EIA Regulations.	The EA process should be undertaken as prescribed in the EIA Regulations. Transfer of the ECC should be done as per the requirements, at the time when so required.

3.2 NAMIBIAN SECTORAL LEGISLATIVE REQUIREMENTS

A number of Namibian legislation and policies have environmental considerations in respect of the proposed Project, as listed in Table 3.2 below.

Table 3.2 *- Cross-sectoral legislation applicable to the project*

STATUTE	PROVISIONS	DEVELOPMENT IMPLICATIONS
NATIONAL SECTORAL LEGISLATION		
Water Act, Act 54 of 1956	Main purpose is to provide for the sustainable development and use of water resources. Makes provision for a number of functions pertaining to the management, control and use of water resources, water supply and the protection of water resources. A distinction is made between private and public water in terms of ownership, control and use. The Act prohibits the pollution of underground and surface water bodies. Liability of clean-up costs after closure / abandonment of an activity.	The Proponent should ensure that water use are as sustainable as possible within the permissible limit and that no pollution of any above and/or below ground water resource takes place.
Water Resource Management Act No. 11 of 2013 (not effected as yet)	The aim of the act is to provide for the management, protection, development, use and conservation of water resources; to provide for the regulation and monitoring of water services and to provide for incidental matters. The Act also regulates disposal of sewage, the purification standards of effluent, the prevention of surface and groundwater pollution, and the sustainable use of water resources.	Once again, the Proponent should ensure that water use are as sustainable as possible within the permissible limit and that no pollution of any above and/or below ground water resource takes place.
Soil Conservation Act No. 76 of 1969, as amended	Prevention and combating of soil erosion; conservation, improvement and manner of use of soil and vegetation, and protection of water sources and provide for matter accidental thereto.	The proposed Project should follow agronomic best practices to adhere to and meet the requirements for soil conservation as set out in the Act.
Forest Act No. 12 of 2001, as amended	Provision for the protection of various plant species. and of the environment.	The project site harbours endemic, endangered and/or protected species,

STATUTE	PROVISIONS	DEVELOPMENT IMPLICATIONS
	Prohibits the removal of and transport of various protected plant species.	such as Camelthorn (*Acacia erioloba*), and Shepherd's tree (*Boscia albitrunca*) Permits are required for the removal of these trees, bushes or shrubs, or any other indigenous plants. A list of plant species and their conservation status is listed in Appendix E.
Nature Conservation Ordinance No. 4 of 1975, as amended	Protects wild animals and indigenous plants. Prohibits disturbance or destruction of the eggs of huntable game birds or protected birds without a permit. Requires a permit for picking (the definition of "picking" includes damage or destroy) protected plants without a permit. Prohibits the removal of and transport of various protected plant species.	The project site may harbour some of the endemic, endangered and/or protected species as listed in Schedule 9 of the Ordinance. Permits are required for the removal of the listed species as indicated in Appendix E.
National Heritage Act (Act 27 of 2004), as amended	The Act requires the identification of cultural and archaeological sites within the study area, registration and protection thereof. Heritage sites or remains are defined in Part 1, as "any remains of human habitation or occupation that are 50 or more years old found on or beneath the surface". Part V Section 46 of the Act prohibits removal, damage, alteration or excavation of heritage sites or remains. Part VI Section 55 Paragraphs 3 and 4 require that any person who discovers an archaeological site should notify the National Heritage Council.	All protected heritage resources (e.g. human remains etc.) discovered, need to be reported immediately to the National Heritage Council (NHC) and require a permit from the NHC before they may be relocated.
Agronomic Industry	Marketing of cereals in the country is	The Proponent must be

STATUTE	PROVISIONS	DEVELOPMENT IMPLICATIONS
Act No. 20 of 1982	regulated by this Act.	aware of this Act and adhere to the stipulations if/where relevant.
Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act No. 36 of 1947	The Act provide for the appointment of a Registrar of Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies; for the registration of fertilizers, farm feeds, agricultural remedies and stock remedies; to regulate or prohibit the importation, sale, acquisition, disposal or use of fertilizers, farm feeds, agricultural remedies and stock remedies; to provide for the designation of technical advisers and analysts; and to provide for matters incidental thereto.	The Proponent must be aware of this Act and adhere to the stipulations if/where relevant for the use of fertilizers.
Hazardous Substances Ordinance No. 14 of 1974, as amended	This ordinance provides for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances. It is administered by the Ministry of Health and Social Services.	Any hazardous waste needs to be handled, stored, and disposed of in a responsible manner and at appropriate waste sites.
Atmospheric Pollution Prevention Ordinance No 11 of 1976, as amended	Provides for the prevention of the pollution of the atmosphere. Part IV of this ordinance deals with dust control and provides for the proclamation of dust control areas.	Excessive dust emissions caused during operations should be avoided or mitigated as it could be categorised as causing a public nuisance under common law.
Public Health Act No. 36 of 1919, as amended Health and Safety Regulations GN 156/1997 (GG 1617)	Section 119 states that “no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health.”	The Proponent should consider and ensure proper human health and safety conditions.

STATUTE	PROVISIONS	DEVELOPMENT IMPLICATIONS
Labour Act No. 11 of 2007, as amended	The Labour Act (No. 6 of 1992), the New Labour Act (no. 11 of 2007) and Government Notice 156 of 1997: Labour Act, 1992: Regulations Relating to the Health and Safety of Employees at Work, governs working conditions of employees. These regulations are prescribed for among others safety relating to hazardous substances, exposure limits and physical hazards. Special consideration must be given to: • Chapter 3: Welfare and Facilities at Work-Places • Chapter 4: Safety of Machinery • Chapter 5: Hazardous Substances • Chapter 6: Physical Hazards and general provision	The cultivation activities involve the operation of heavy machinery. The Proponent needs to comply with health and safety regulations during these operations. Operational activities should also not result in any potential negative health implications to the labourers and/or larger community.

While it has been set out to list all those laws and regulations, which regulate the healthy functioning of the environment, it is not necessarily complete and the proponent has the responsibility to make themselves aware of all applicable legislation and permit requirements applicable to the Project.

3.3 INTERNATIONAL TREATIES AND CONVENTIONS

The international treaties and conventions applicable to the Project and worth taking note of are listed below in Table 3.3 below.

Table 3.3 *- International Treaties and Conventions applicable*

STATUTE	PROVISIONS	DEVELOPMENT IMPLICATIONS
Convention on Biological Diversity 1992	Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use. Promote the protection of	Removal of vegetation cover and destruction of natural habitats should be avoided and where not possible minimised.

STATUTE	PROVISIONS	DEVELOPMENT IMPLICATIONS
	ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings.	
The United Nations Convention to Combat Desertification 1994	Focuses on land degradation in the dry lands where some of the most vulnerable ecosystems and people in the world exist.	The Project should adhere to land management, which contributes to the conservation and sustainable use of biodiversity and the mitigation of climate change.
Stockholm Declaration on the Human Environment 1972	Recognises the need for: *"a common outlook and common principles to inspire and guide the people of the world in the preservation and enhancement of the human environment"*.	The proponent should strive to protection of natural resources and prevention of any form of pollution.
National Policy on Climate Change for Namibia 2011	Seeks to promote the primary government objectives, which include job creation, provision of basic services and infrastructure development, alleviation of poverty and provision of housing. These priorities are generally compatible with the principles of sustainable development.	Climate Change Adaptation measures should be implemented as stipulated in the community information toolkit on adaptation for Erongo, Hardap, Karas and Khomas Regions (*MET 2011*)
United Nations Convention on the law of non-Navigational Uses of International Watercourses and the Protocol on Shared Watercourses	This Protocol defines watercourses in accordance with the UN Convention on Use of International Watercourses, which are defined in that Convention as systems in which surface and ground waters flow into a common terminus. The SADC Protocol lays down principles for the coordinated, cooperative and equitable use of water by riparian countries. It takes issues of social development and environmental protection into account, and mandates an exchange of information among the riparian states about plans and projects pertaining to shared water resources. The SADC protocol provides for the development	Namibia, Botswana and South Africa are members of the SADC and are riparian countries of the SAB. They are therefore committed to support the SADC Protocol on Shared Water Resources (a revised version of which came into force in 2003). Given the importance of transboundary aquifers in the SADC region, experts have called for an SADC agreement that specifically focuses on groundwater. To this end, accurate

STATUTE	PROVISIONS	DEVELOPMENT IMPLICATIONS
	of joint management mechanisms (e.g. at the river basin level) and supports the IWRM concept, which implicitly includes groundwater.	groundwater maps, groundwater classification in terms of hydrogeological characteristics and future demands, and adequate management regimes are deemed necessary

3.4 AGREEMENTS, PERMITS, LICENCES AND/OR APPROVALS REQUIRED

The following agreements/permits and/or licenses (Table 3.4) should be concluded/obtained prior to construction.

Table 3.4 – *Permits, licences, approvals and/or agreements that may also be required.*

Activity	Type of Permit / Licence	Legislation / Institute
Environmental Clearance Certificate (ECC) for increased groundwater abstraction.	Environmental Impact Assessment in progress	Ministry of Environment, Forestry and Tourism
Valid permits for abstraction of groundwater for all operational boreholes	Application process awaits the ECC	Ministry of Agriculture, Water and Land Reform
Removal of protected and indigenous species	Permit if required	Ministry of Environment, Forestry and Tourism
Electricity supply	Contract and connection already exist.	NamPower

4 DESCRIPTION OF THE PROPOSED IRRIGATION DEVEOPMENT

This chapter provides a description of the proposed irrigation development (the Project). It describes the details pertaining to the Project Site's locality, existing farming and agronomic activities as well as infrastructure. It also describes the envisaged increased water abstraction.

The description has been compiled based on primary information obtained from the Proponent, site visits, Geohydrological study, Ecological study as well as secondary information.

4.1 NATIONAL STRATEGIES & POLICIES

In the successive series of National Development Plans of Namibia, the Agriculture sector has been singled out as one of the priority sectors of the country. The sector is viewed to bring about much needed socio-economic development and improvement to the livelihoods of the majority of the Namibian people.

Namibian policy makers are, however, aware that water is a scarce and valuable resource. Therefore, an economic value is placed on water in order to include environmental externalities in the water costs and to encourage efficient and sustainable resource supply.

4.1.1 NATIONAL WATER POLICY WHITE PAPER

The National Water Policy provides a framework for equitable, efficient and sustainable water resources management. It provides for water services and stresses sectoral co-ordination, integrated planning and management as well as resource management aimed at coping with ecological and associated environmental risks. The policy makes it clear that water concerns extend beyond human needs for health and survival, but also recognises that water is essential to maintain natural ecosystems and that in a country as dry as Namibia, all social and economic activity depends on healthy aquatic ecosystems.

One of the strategies provided to ensure environmental and economic sustainability is to ensure that in-stream flows are adequate both in terms of quality and quantity to sustain the ecosystem. The policy proposes to protect water resources from pollution by enforcing the 'polluter pays principle' and regular water quality monitoring on all proposed projects. Principles contained in the policy, that are applicable to the Project, include:

Ownership of water – Namibia's limited and vulnerable water resources are an indivisible national asset, whose ownership is vested in the state on behalf of the whole society.

Integrated management and planning – Management and planning of water resources should be integrated across economic, environmental and social dimensions.

Water for ecosystems – Water resources management needs to harmonise human and environmental requirements and recognise the role of water in supporting ecosystems.

Recognition of economic value – Economic value of water resources in Namibia should be recognised given their scarcity and vulnerability and that abstraction, management, conservation and use should be efficient and cost effective.

4.1.2 THE NAMIBIA AGRICULTURE POLICY 2015

According to the Namibia Agriculture Policy 2015, Agriculture is a very important sector in the Namibian economy as it continues to support the livelihoods and create employment for the majority of the population. The aims of the policy are largely economic and focus on increasing agricultural production, agro-processing and marketing as well as real farm income as a contribution to national household food security.

It further recognises the limitations imposed by the Namibian climate and soils and seeks to promote sustainable utilisation of the land and other natural resources within the context of a vulnerable ecosystem. As such, Agriculture activities should not be pursued at the expense of the environment and all stakeholders, that benefit from agriculture, are required to accept responsibility for sustainable management of natural resources.

4.1.3 THE GREEN SCHEME POLICY

The Green Scheme Policy is an initiative conducted by the then Ministry of Agriculture, Water and Rural Development to encourage the development of irrigation based agronomic production in Namibia, with the aim of increasing the contribution of agriculture to the country's Gross Domestic Product and to simultaneously achieve the social development and upliftment of communities located within suitable irrigation areas. The policy makes provision for several irrigation projects to be commenced in Namibia.

The implementation of this policy has, however, been marked by several obstacles, due to the fact that Namibia is one of the driest countries south of the Sahara. It now supports the implementation of conservation agriculture programmes. It emphasises environmental impact assessment requirements and water pricing methods.

4.1.4 INSTITUTIONAL ARRANGEMENTS IN NAMIBIA

The Department of Water Affairs and Forestry for Namibia (DWAF) within the Namibian Ministry of Agriculture, Water and Land Reform has a Geohydrology Division, which is responsible for all water resource development projects in the country, including irrigation planning and development.

Groundwater extraction in Namibia is controlled through a permit system. A licence has to be obtained before any drilling work may be carried out, and all boreholes have to be licensed for purposes of supervision.

In 1955, the existing laws governing use of artesian water were consolidated in the Water Ordinance No 35 of 1955, and the SAB was formally declared a Subterranean Water Control Area. The Ordinance also required that information about the actual quantity of water extracted must be provided by the permit holder. After the Articles of the South African

Water Act (Act No 54 of 1956) were made applicable in Namibia, regulations were promulgated to monitor the sustainable use and management of artesian water sources, including those of the SAB (*Alker, 2007*).

At present, existing laws and regulations are enforced in the form of co-operation with water users. Groundwater management is controlled by means of both the permit system and the activities of local water user committees. User participation is institutionalized in Namibia through Basin Management Committees. These organizations are created for surface water basins. In view of concerns on the part of both local water users and the government about possible over-extraction of water in the SAB in Namibia, an aquifer management committee, the so-called Stampriet Basin Water Committee**,** was formed to assist the Department of Water Affairs and Forestry in monitoring water utilization in the basin.

The Department consults with the Committee about new applications for water development, and the Committee provides information about the extraction of water, the management of water resources, the illegal drilling of boreholes, leakage of boreholes, and any wasteful use of water. The Department also monitors water levels and gives technical advice to the drilling industry about the development of boreholes under artesian conditions. Aquifers in the SAB are persistently used where water occurrence and water quality are favourable.

4.2 EXISTING FARMING OPERATIONS

The Remainder of Farm Grunewald is 4559.1 ha in extend and is predominantly used for small stock and indigenous game grazing on natural vegetation. Four centre pivot irrigation fields (two of 16 ha and two of 20 ha each) were developed close to the homestead in the north-eastern part of the farm. Water for irrigation are sourced from two boreholes (WW200904 and WW203390) that are registered with the MAWLR under Permit Number 10785.

4.3 PROJECT'S TECHNICAL DETAILS

4.3.1 PROJECT OVERVIEW

To cultivate wheat and maize rotationally on all four irrigation fields, increased water abstraction from two additional boreholes (WW204682 and WW204683) is required. These two have already been drilled and registered with the MAWLR, but are still without a permit. Refer to Fig. 4.3 for the location of the boreholes on the Remainder of Farm Grunewald No. 135.

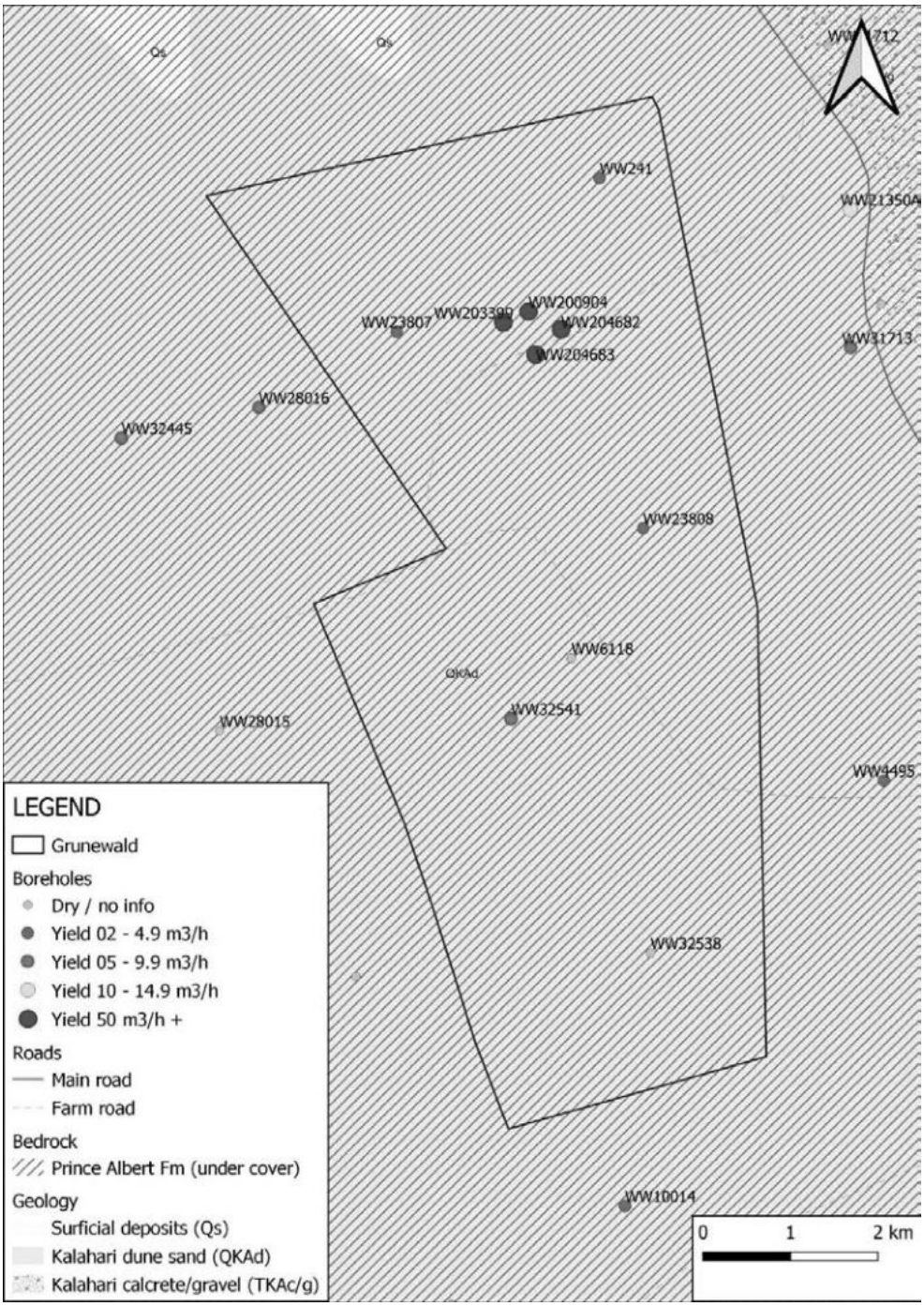

Fig. 4.3 – *Locality of Boreholes on the Remainder of Farm Grunewald No. 135*

(source Van Vuuren, 2022)

4.3.2 SUPPORTING INFRASTRUCTURE

(i) Roads & Access

The Remainder of Farm Grunewald No. 135 can be reached via the C15 that runs between Stampriet and Gochas. A gravel access road from the C15 runs approximately 1-2 km

towards the homestead. Kalahari sand roads run between the homestead, irrigation fields and the rest of the farm. These are accessible with 4x4 vehicles, trucks and tractors.

(ii) Electricity

NamPower electricity is available on the farm. Solar panels have also been installed on the farm near the homestead and can generate an additional 50 kVA. See Photo 4.1 below.

Photo 4.1 *– On-farm solar panels*

(iii) Water Pumps and Pipelines

Water is sourced from the SAB with submersible pumps through boreholes. Refer to Fig. 4.3 for the locality of the boreholes on the farm. The water is conveyed with a pipeline to tanks located at the central tower of each center pivot. From here it is distributed evenly over the irrigation field through the center pivot irrigation system.

(iv) Centre Pivots

A centre pivot is a movable pipe structure that rotates around a central pivot point connected to a water supply i.e. a borehole in this case. See Photo 4.2 below.

Photo 4.2 *– Centre pivot irrigation system*

The water is pumped from the water source (boreholes) through pipes to tanks at the central tower located in the middle of the crop field. See Photo 4.3 below.

Photo 4.3 – *Central tower of centre pivot*

Water is supplied through the pipe structures to the sprinklers that supply water drops of the right size to the crops to optimize maximum absorption into the soil. The centre pivot moves automatically, powered by a motor.

Fertilizer can be administered through the centre pivot to ensure the correct amount for maximum absorption and least wastage.

(v) Run-off

The centre pivot irrigation system can be set to apply the right amount of water close to the root system of the crops. No access run-off water should be present under the correct settings to ensure optimal water usage and no wastage of water.

(vi) Buildings

In addition to the homestead, a warehouse of steel and corrugated zink for tractors and implements as well as underroof stores for produce exist on the north-eastern part the farm. Tractors and implements for cultivation are present on the farm. Houses for 7 permanent labourers are situated close to the homestead area. No further construction is envisaged for the expansion of the irrigation activities.

Photo 4.4 – *Underroof Storage for Produce*

The impacts expected to occur during increased water abstraction, the assessment therefore and the mitigations recommended are discussed in more detail in Section 7.4, while the environmental requirements are listed in much detail within the Environmental Management Plan (EMP), attached in Appendix G.

4.3.3 SITE PREPARATION ACTIVITIES & METHODOLOGY

This section predicts activities associated with the preparation of the irrigation fields and is presented below.

4.3.3.1 Soil Preparation

Soil preparation will entail ploughing/tillage and fertilising. Fertilising must be done according to the soil composition and requirements to plant wheat and maize.

Photo 4.5 – *Gypsum to be used as fertiliser*

4.3.3.2 Planting

In the winter wheat will be planted to be harvested in summer and during summer maize will be planted to be harvested in winter.

4.3.4 OPERATIONAL ACTIVITIES AND METHODOLOGY

The activities associated with the operational phase are presented below.

- Day-to-day site checks, which include:
    - Daily rounds of the irrigation fields along existing tracks;
    - Inspect pump operation;
    - Check for leaks;
    - Check operating pressures;
    - Check tyre pressure;
    - Inspection of cultivar and soil condition;
    - Signs of insects, pests or diseases;

- Signs of damage by mammals and birds.

- Watering and fertilising by means of the centre pivot irrigation system, as described in Section 4.3.2.

- Repair and Maintenance of centre pivot:
  - Pre-season maintenance that involve checking the electrical and hydraulic systems, drive train assemblies, sprinklers and regulators system leaks;
  - Perform borehole maintenance;
  - Empty the sand trap;
  - Clear sprinkler blockages;
  - Major repair and maintenance can be undertaken by the Zimmatic agent;

- Weeding and pest control.

- Harvesting.

- Storage and/or transportation of produce off-site.

4.3.5 DECOMMISSIONING

It is the understanding that every Project should have a Project Life, after which rehabilitation to its natural pristine condition should take place. Decommissioning and rehabilitation will be the responsibility of the Proponent. It should be undertaken according to a Decommissioning & Rehabilitation Plan in consultation with a Botanist or Ecologist to advise on how to go about restoring the area to its pristine condition. It will involve:

- Lease or sale of farm buildings to prospective farmers; or
- Demolishing and removal of all temporary and permanent structures;
- Sale of equipment which are not obsolete;
- Disposal/sale of any scrap material;
- Appropriately dispose or level any unwanted heap of material left at the site;
- Preparation of disturbed areas;
- Search and relocate local indigenous vegetation onto the site;
- Rehabilitation to *Southern Kalahari* vegetation; and
- Rehabilitation monitoring.

4.4 ALTERNATIVES CONSIDERED

4.4.1 SITE LOCALITY

The sites for the irrigation fields were selected by taking into consideration topography, soil conditions and the availability of water sources (i.e. boreholes are the only source in this case).

The four sites were selected in two consecutive "streets" between the longitudinal dunes where slope and soil composition are more suitable. The sites are also located in the north-eastern part of the Remainder of Farm Grunewald No. 135 close to the available boreholes (See Fig. 4.3 in Section 4.3.1). The distance for water pumping is thus minimum and it is close to the available infrastructure to make logistical arrangements easier.

4.4.2 WATER SOURCE

Irrigation water will be sourced through existing boreholes on the Remainder of Farm Grunewald No. 135 from the SAB. The Auob River flows in a north-south direction approximately 2 km to the east of the farm, but flows only ephemerally (See Fig.5.1 in Section 5.1). No other ground or surface water sources are available. Rain fed irrigation is not sustainable in this area of the *Southern Kalahari*, due to the low and erratic rainfall conditions.

4.4.3 IRRIGATION METHOD

Centre pivot irrigation systems are currently the most popular sprinkler irrigation systems in the world, because of their high efficiency, high uniformity and ability to irrigate uneven terrain. Fertilizer can also be administered through the centre pivot to ensure the correct amount for maximum absorption and least wastage. They are among the most water efficient ways to irrigate crops, with 85% to 98% water use efficiency. Benefits include:

- Increased yield in less cultivated area.
- Protection against drought.
- Decreased production cost.
- Use 25 – 50 % less water compared to traditional irrigation methods, because it supplies the right amount of water when and where it is required.

4.4.4 ALTERNATIVE ELECTRICITY SUPPLY

Power for the centre pivots is sourced from the NamPower grid through a private distribution network. A solar system that can generate 50 kVA exists near the homestead to supplement electricity supply (see Photo 4.1 Section 4.3.2 (ii)).

Namibia's solar energy potential is very high and this resource has the most significant potential for the supply of energy. Stampriet falls within the solar radiation category of 6.0-6.2 kWh/m² with an average 10 - 11 hours of sunshine per day. (*Mendelson et al., 2002*)

Solar power can thus be successfully harvested as an additional source of energy on the farm.

4.4.5 CROP SELECTION

Food crops, i.e. wheat and maize were selected instead of cash crops. This will contribute positively towards food security in Namibia.

4.4.6 THE NO-GO OPTION

The no-go alternative would be not to proceed with the proposed expansion of the irrigation. If the additional two boreholes and centre pivot irrigation fields of 40 ha are not prepared and planted, the area will remain in its pristine condition for livestock farming.

Sheep, goats, cattle and game are successfully farmed in the area in an extensive way. It is less labour intensive than crop farming and livestock breeds that are well-adapted to arid regions are well established in the area. Livestock and game are sold at auctions, directly to local buyers, hunters, abattoirs and butchers or on an ad hoc informal basis.

Proceeding with the irrigation development will imply potential positive socio-economic benefits towards job creation and food security. Capital costs and running costs for irrigation farming are higher than livestock farming, but yield per ha is also higher. If proper mitigation measures regarding groundwater abstraction and pollution and soil deterioration will be implemented, environmental costs can be decreased to a sustainable level.

4.5 PROJECT BENEFITS

4.5.1 SOCIO-ECONOMIC

4.5.1.1 Employment

The Project will provide full-time employment to 11 labourers and an additional 6 labourers will be required on an ad hoc basis for harvesting and other crop production activities. This will bring job opportunities to the Witkrans community, where limited economic activities take place. The Witkrans community is located within 10 km from the remainder of Farm Grunewald No. 135 along the C15 main road.

4.5.1.2 Contribution to Food Security

The Project will contribute to Namibia's food security through increased local production of maize and wheat to the local Namibian market. Produce will be delivered to Namib Mills in Mariental from where processing and distribution will take place.

5 THE AFFECTED ENVIRONMENT

This chapter describes the details pertaining to the larger study area's existing physical, biophysical and socio-economic environments, which defines the sensitivities to be considered for the expansion of irrigation and water abstraction.

This chapter provides baseline information according to which the likely negative and positive impacts of increased irrigation farming will be assessed, as well as the significance thereof, which in turn will inform the applicable mitigating measures and need for any further detailed assessments.

A great deal of this chapter is derived from specialist input (i.e. Ecological Study as discussed in this section and Appendix E and Geohydrological Assessment attached as Appendix D).

5.1 LOCALITY

The Remainder of Farm Grunewald No. 135 is located approximately 18 km south, south-east of Stampriet in the *Southern Kalahari Biome* of Namibia.

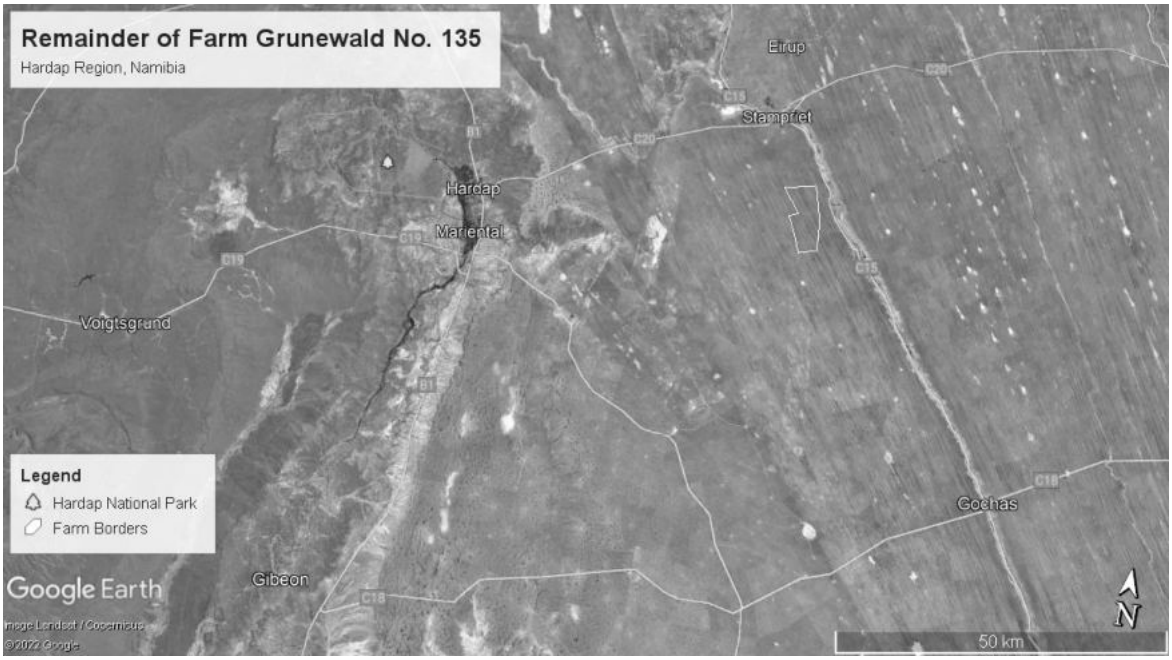

Fig 5.1 – *Locality of Remainder of Farm Grunewald No. 135 south, south-east of Stampriet and west of the Auob River*

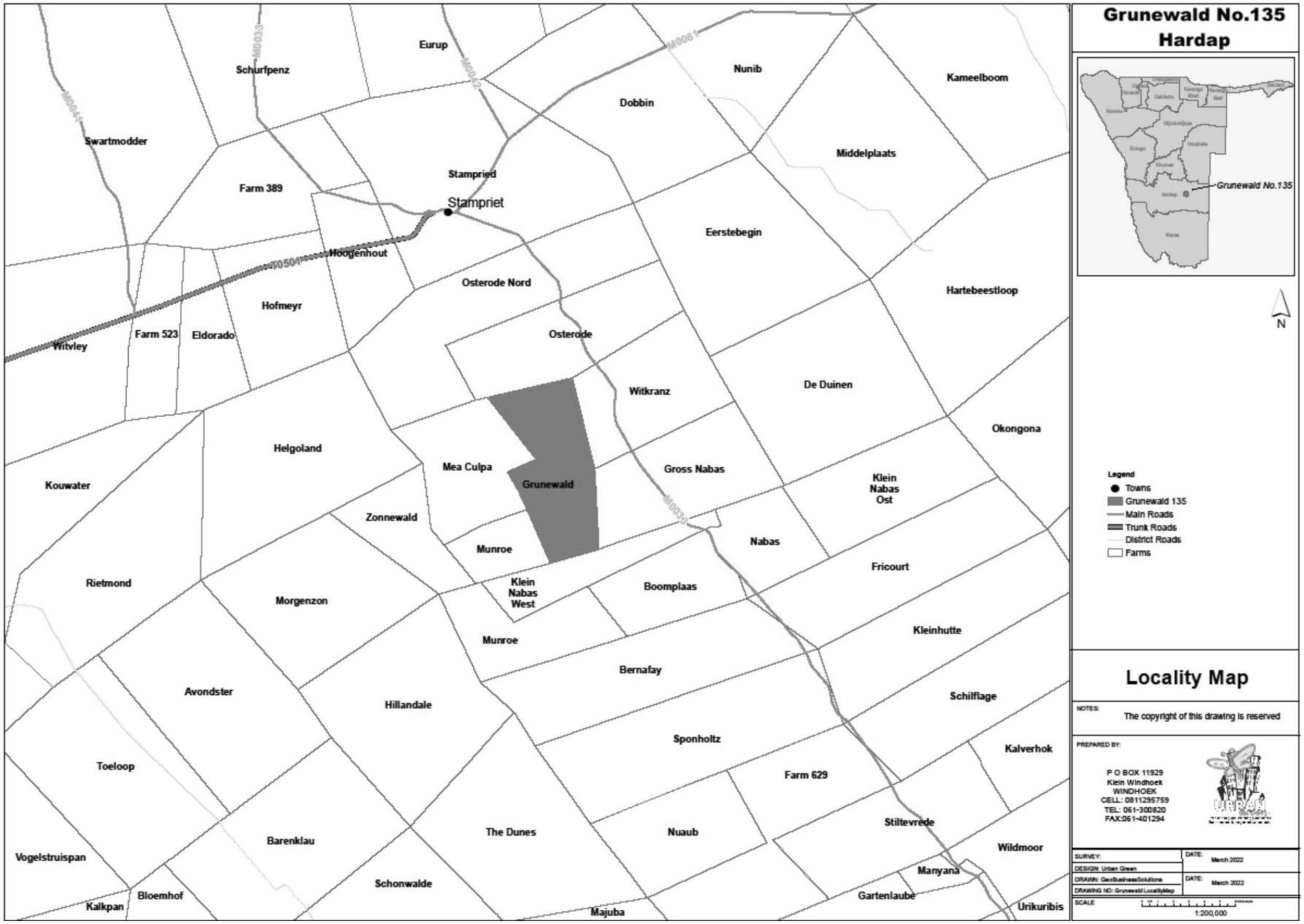

Figure 5.2 – *Locality of The Remainder of Farm Grunewald No. 135 south-east of Stampriet and west of the C15 road that connects Stampriet and Gochas*

5.2 PHYSICAL ENVIRONMENT

The physical environment is typical of the *Southern Kalahari* biome found within the south-eastern parts of Namibia, which directly determines this particular bio-physical environment (refer to Section 5.3).

The proposed Project will by its nature impact on the project site's physical character and vice-versa, which again will affect the bio-physical environment.

5.2.1 CLIMATE

5.2.1.1 Temperature

The average maximum temperatures during the hottest months (December, January and February) range between 34-35 °C, while average lowest temperatures in winter (June, July and August) can go lower than 2 °C. Refer to Fig. 5.3 below.

The Project area is thus located in the coldest area of the country and frost is more frequent here.

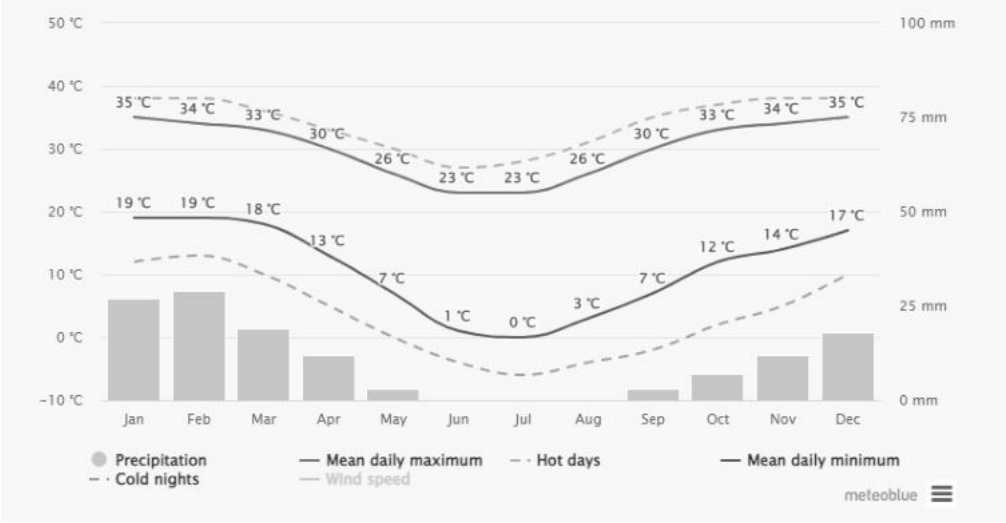

Figure 5.3 *- Temperatures and precipitation for Stampriet area (source www.meteoblue.com)*

5.2.1.2 Precipitation

Average annual rainfall vary between 200 - 250 mm with rainfall highest in December, January and February (refer to Fig. 5.3). Average annual evaporation is estimated at 2 240 – 2 380 mm/year, which leaves a water deficit of approximately 2 100 – 2 300 mm per year.

Humidity in the area can range from 10 – 20 % in the least humid months (October) to 60-70% in the rainy season.

5.2.1.3 Frost

The Project area is prone to frost for 20 – 30 days of the year in winter. (*Mendelson*, *2002*).

5.2.1.4 Sunshine and Solar Radiation

The average hours of sunshine in the Stampriet area is approximately 10-11 hours per day and solar radiation is estimated at 6.0-6.2 kWh/m^2 per day (*Mendelson 2002*). Solar power can thus be successfully harvested here.

5.2.1.5 Wind

The wind rose of Stampriet shows in Fig. 5.4 that wind is predominantly north and north, north-east, which correlates with the directions of the dune alignment in the area. The alignment of dunes reflects the direction of the prevailing winds when the dunes were formed.

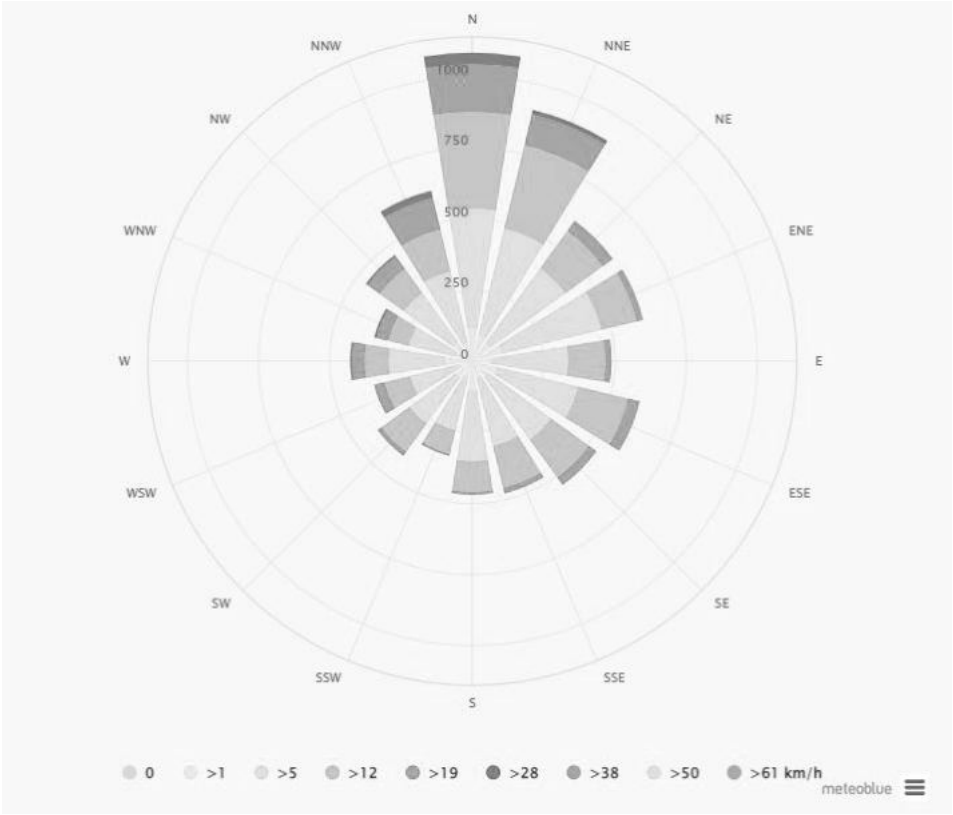

Fig. 5.4 – *Prevailing winds in the Stampriet area*

5.2.2 GEOLOGY AND HYDROGEOLOGY

The Remainder of Farm Grunewald No. 135 falls within the Kalahari Group with Kalahari Sand Rock Type. Over millions of years the Kalahari Basin has progressively filled up with

sands and water-borne deposits, the nature of which vary according to whether the area was going through a phase of high or low rainfall. The deposits of sands, clay and calcretes that make up the Kalahari Group cover the eastern parts of the Nama Basin. Some of the river systems in the vast area covered by the Kalahari Group remain active, some flow intermittently, while others are essentially dormant at present.

Dune fields have likewise come and gone, and many of the neatly arranged linear dunes in various areas were formed during much drier times long ago. Please refer to the Geohydrology Report Chapter 3 in Appendix D for a detailed description of the Geology of the area.

5.2.2.1 Stampriet Artesian Basin (SAB)

The Stampriet Artesian Basin (SAB) is shared by Namibia, Botswana and South Africa. The presence of fresh water is of special value in the very arid environment where brackish and saline groundwater frequently occur. Although all three countries share the groundwater basin, only Namibia makes significant use of its groundwater. The natural conditions, i.e. groundwater occurrence and quality are more favourable on the Namibian side.

(i) Extend of the SAB

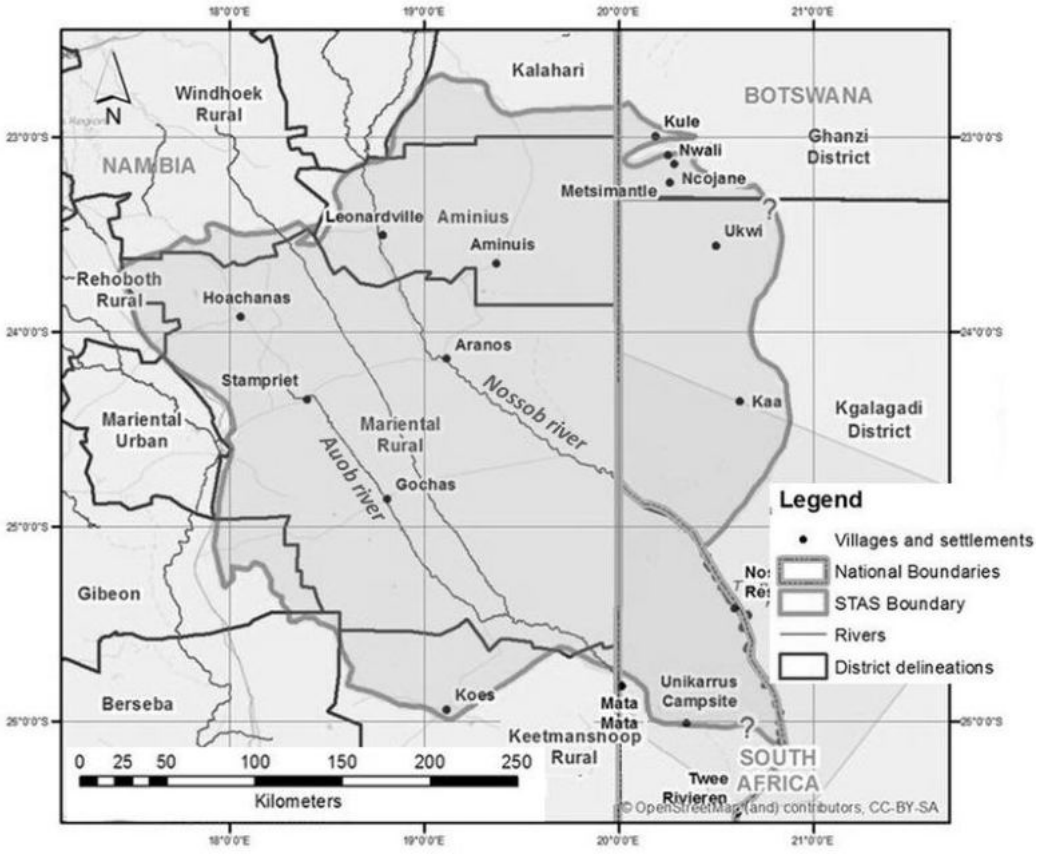

Fig. 5.5 – *Extend of the Stampriet Artesian Basin (SAB)* *(source IGRAC)*

The SAB covers an area of approximately 70 000 km^2 in Namibia.

On the east, the basin stretches into Botswana and South Africa across the Namibian border, which runs along the 20° east longitude line.

In the south, the boundary runs along a line south of which no artesian conditions exist.

In the west, the boundary is formed by the escarpment of the Weissrand Plateau along the watershed between the Orange River Basin's Fish River sub-catchment to the west and Auob River sub-catchment to the east.

In the northwest, the boundary follows an arbitrary margin that delineates where sandstone with artesian groundwater may still be encountered under the Kalkrand Basalt.

The northern boundary is visible in the form of sub-outcrops of Karoo strata.

(ii) Hydrogeology of the SAB

The three main aquifers in the SAB in Namibia are in the Kalahari Beds, the Auob Sandstone and the Nossob Sandstone. The Auob and the Nossob Sandstone Aquifers lie in the Ecca Group of the lower Karoo Sequence and are separated by shale layers of the Mukorob Member, which is overlaid by Rietmond Shale and Sandstone. The Auob and Nossob Aquifers are confined and free flowing in the Auob Valley from Stampriet and further downstream, as well as in the Nossob Valley around Leonardville. (*Alker, 2007*).

(iii) Quantity of water in the SAB

It is estimated that the total quantity of water stored in the SAB's aquifers is 357 billion m^3, of which 120 billion m^3 (33.6 %) is thought to be present in the Kalahari Aquifer, 180 billion m^3 (50.4 %) in the Auob, and 57 billion m^3 (16,0 %) in the Nossob (*Alker, 2007*)

(iv) Quality of water in the SAB

Groundwater quality deteriorates in a south, south-easterly direction, because the Kalahari, in the central parts of the basin, consists mainly of fine sand, silt and clayey deposits. These have accumulated mineral salts due to low rainfall and run-off as well as high evaporation. The confining layer of the Auob Aquifer has also been largely carried away in the south-eastern parts of the pre-Kalahari River, resulting in saline groundwater. That is why the south-eastern area of the SAB is referred to as the “Salt Block”, because of the brackish to saline water in the Kalahari, Auob and Nossob Aquifers here.

The quality of artesian water in the upper part of the basin is in the order of 1,000 to 2,000 mg dissolved solids/l, but this deteriorates to more than 5,000 mg dissolved solids/l in the south-eastern parts of the basin (*Alker, 2007*).

(v) Recharge of the SAB

Most SAB recharge is thought to occur on the Namibian side. Estimates are that recharge to the SAB in normal rainfall years is relatively low, but that considerable recharge may occur during wet years, i.e. about once every fifty years. Recharge to all aquifers in the basin during years with average rainfall is estimated at 105 million m^3/year, or 0.5 % of rainfall. However, recharge in wet years may be as much as 3 %, or around 1.5 billion m^3.

It has been confirmed that water tables begin to rise in artesian aquifers some 50 km from these recharge areas a few weeks after heavy rainfall has occurred. In addition, isotopic evaporation of the water in these artesian aquifers is very low or non-existent (*Stone and Edmunds, 2011*).

(vi) Water extraction from the SAB

A hydro-census conducted in 2000 found that of a total number of 6,280 boreholes in the SAB, 4,915 are currently in use, of which 3,915 tap the Kalahari Aquifer and 1,000 the artesian aquifers (*Stone and Edmunds, 2011*).

Extraction from the Kalahari Aquifer is estimated to be 9.8 million m^3/year. This comprises about 65 % of all water extracted in the SAB in Namibia. Of the 1,000 boreholes drilled into artesian aquifers, 200 (20 %) yield artesian flow, while 800 (80 %) tap sub-artesian water levels. 4.97 million m^3/year are extracted from the Auob Aquifer and 0.2 billion m^3/year from the Nossob Aquifer.

The depth of the boreholes ranges from 250 to 380 m. The age of the water is less than 40,000 years, and the water temperature is around 30 °C (*Alker, 2007*).

Studies of the SAB indicate that effective control and monitoring of groundwater quantity is essential to establish sustainable use of the resource. To this effect monitoring of the SAB has been improved in order to keep track of abstraction quantities to arrive at results on the basis of which reasonable allocation decisions can be made.

5.2.3 TOPOGRAPHY AND HYDROLOGY

The south-eastern areas of Namibia to the east of the Weissrand are relatively flat with longitudinal sand dunes and linear inter-dune valleys that run in a north - west to south - east direction.

A surface drainage system runs from the northwest to the southeast across the Stampriet Artesian Basin. The Auob, Olifants and Nossob Rivers are ephemeral watercourses that are part of the larger Orange River Basin in Southern Africa. These rivers flow only when above-average rainfall occurs, but they are endoreic within the Orange River Basin. This means that their runoff never reaches the Orange River but rather dissipates into the Kalahari Desert north of the Orange River. The Auob River flows to the east of the farm.

Also refer to Appendix D Geohydrology Report Chapter 2, Figure 2 for a description of the Topography and Hydrology.

5.2.4 SOIL

5.2.4.1 Ferralic Arenosols

The soil type in the general area is *Ferralic Arenosols*. They are formed from wind-blown sand, with sand generally making up more than 70% of the soil. The depth can extend to at least one metre. The rest of the soil usually consists of particles of clay and silt.

The sandy texture allows water to drain through the soil rapidly, leaving very little moisture at depths to which most plant roots can reach. Few nutrients are retained in the porous sand. The loose structure of sand means that there is little run-off and water erosion, although it makes the soils susceptible to wind erosion if they are not stabilised by vegetation (*Mendelson et. al. 2002*).

Decalcification of the surface layer is common. As the parent material is chemically inert and the soil contains low quantities of clay minerals and organic carbon, *Arenosols* have low inherent fertility and poor buffering capacity (*Coetzee, 2021*).

Photo 5.1 – *Tillage soil of the Project Site*

5.2.4.2 Arenic Calcisols

However, the soil of the interdune valleys (“streets”) in the Kalahari, such as on the Remainder of Farm Grunewald where the irrigation fields are located, can be described as

Arenic Calcisols. This is evident in the calcic or petrocalcic horizon that occur within the first 100 cm from the surface, even though coarse, reddish Kalahari sand cover the surface. Refer to photo 5.2 which show shallow calcrete (petrocalcic horizon) in the Kalahari interdune valley, broken up and brought to the surface during preparation of irrigation fields.

Photo 5.2 – *Calcrete (petrocalcic horizon) that was unearthed to prepare irrigation fields*

Calcisols form in alluvial, colluvial and aeolian parent materials that are rich in bases, notably calcium and magnesium. Movement of calcium carbonate [$CaCO_3$] from surface horizons to an accumulation layer at some depth is one of the most widespread soil-forming processes in arid climates. The surface horizon is often completely or partially de-calcified, as calcium carbonate is dissolved by rainwater, the calcium [Ca^{2+}] and bicarbonate [HCO_3^-] ions are leached from the upper part of the soil and precipitated as calcite (a form of calcium carbonate) further down where the percolation stops and water evaporates. Alternative wetting (by rain) and drying (by evaporation) of the soil tend to concentrate the calcium carbonate in a calcic horizon. See this layer in photo 5.2. In time, calcic horizons can become indurated (cemented, petrified) by calcium carbonate and/or magnesium carbonate into nodular, lamellar or massive, extremely hard petrocalcic horizons (calcrete).

Calcisols typically have a thin surface horizon that has low porosity, as soil pores are filled with calcium and magnesium. The sparse vegetation and high temperatures result in low organic matter content. Soil faunal activity is high in these soils.

Photo 5.3 – *Signs of faunal activity in the soil of the Project Site*

Calcisols have neutral to high pH (≥ 7) that may reach 8-8.5 in the subsoil if free carbonates are present. They usually contain high amounts of bases [Ca, Mg, to a lesser extent K]. These will not necessarily be accessible to plants, if excess calcium is present, since the uptake of phosphate and many trace elements are suppressed by the high pH and the predominance of calcium and magnesium.

Most *Calcisols* have fine to medium texture and good water retention. Internal drainage and root development are impeded if the petrocalcic horizon is strongly and continuously cemented. However, a petrocalcic horizon beneath a thick B horizon can be an asset in an arid climate with very sandy soils, as it allows water to be retained in the root zone for longer.

Calcisols can be productive under irrigation with good management practices for fertilization and to prevent salinisation and erosion (*Coetzee, 2021*).

5.3 BIO-PHYSICAL ENVIRONMENT

The bio-physical environment was studied through a site visit, sampling and literature review (i.e. desktop study) by the Ecologist.

The Remainder of Farm Grunewald No. 135 falls within the *Southern Kalahari* Biome on Kalahari sandveld and have open *Acacia* woodlands. Low vegetated dunes run in a north-west to south-east direction with flat areas (“streets”) in between dunes.

Overall terrestrial diversity and endemism is low (*Mendelson et.al. 2002*).

Photo 5.4 – *Southern Kalahari sandveld of the Project area*

Hardap Recreation Resort is approximately 60 km to the west of the Project Site and is the nearest protected area where all of the species in addition to other water bird species could be found and protected (see Fig. 5.1, Section 5.1).

5.3.1 FLORA

Plant diversity is low with an estimate of between 50-99 species recorded. (*Mendelson et al. 2002*)

5.3.1.1 Grass

Grasses are prevalent in the “streets” between dunes. Certain grass species are adapted to also occur on the dunes where it provides soil stability to the Kalahari sand and protects the dunes from wind displacement. The predominant grass species is *Smidtia kalahariensis*, known as “suurgras” in the area. This grass species prefers sandveld and is the first grass that sprouts after good rains. It is a hardy annual grass and can grow as high as 1m in good rain seasons. It produces an acid, from where the local name originated.

Other grass species observed on Project Site are various *Stipagrostis* species, such as *Stipagrostis namaquensis*, *S. obtusa*, *S. ciliate*, *S. uniplumis* and *S. hirtigluma*. In the Kalahari duneveld also occurs *Stipagrostis amabilis* where it grows on the crest of dunes. Refer to Appendix E – for a list of grass species and their status, which are likely to occur in the general area.

Photo 5.5 – *Smidtia kalahariensis* *Stipagrostis species*

5.3.1.2 Trees and Shrubs

Conspicuous of the Kalahari landscape is the occurrence of *Acacia erioloba.* Although widespread and common, camelthorn trees are very slow growing and does not regenerate rapidly. *Boscia albitrunca* is another species of concern that can grow to a height of 5 m in this part of the country. Both *Acaia erioloba* and *Boscia albitrunca* are protected under the Forest Act No. 12 of 2001 and a permit from the Ministry of Environment, Forestry and Tourism is required to remove any of them.

Photo 5.6 – Camelthorn tree (*Acaica erioloba*) Shepherd tree (*Boscia albitrunca*)

Other tree and shrub species observed on the Remainder of Farm Grunewald No. 135 are various *acacia* species, such as *Acacia hebeclada*, *A. haematoxylon*, *A. karroo, A. leuderitzii and A. melifera.* Refer to Appendix E for species list of trees and shrubs expected to occur in the general area.

5.3.2 FAUNA

It is estimated that at least 45 reptile, 3 amphibian, 47 mammal and 131 bird species are known to or expected to occur in the general area.

5.3.2.1 Reptiles

At least 45 species of reptiles are expected to occur in the general area of which 12 species are listed as endemic (27% endemism).

Two species expected to occur in the area is classified as Vulnerable (Southern African Python and Rock Monitor).

The 45 species of reptiles to occur in the area consist of at least 2 tortoise species (both vulnerable and protected), 19 snakes of which 4 species are endemic (21%), 20 lizards of which 4 species classified as endemic (20% endemic), and 6 geckos of which 4 species are classified as endemic (66% endemic).

5.3.2.2 Amphibians

Due to the lack of surface water for most of the year, only 3 species of amphibians are listed to occur in suitable habitat in the general Stampriet area. Only one species (African bullfrog) is near threatened, while the other 2 are secure.

5.3.2.3 Mammals

Approximately 47 species of mammals are listed to occur in the general Stampriet area of which 3 species (6.4 %) are classified as endemic and 10 species is known to have conservation concern. Refer to Appendix E for the list of mammals expected to occur in the area and their conservation status.

5.3.2.4 Avifauna

131 Bird species were identified to occur in the general Stampriet area. Conspicuous birdlife observed during the site visit includes an active vulture population and nests and activities of sociable weavers.

Refer to the avifauna species list in Appendix E for a list of expected bird species and their conservation status in the area.

Photo 5.7 – *Vulture*

Sociable weavers nest

5.4 LAND USE AND INFRASTRUCTURE

5.4.1 AGRICULTURE

The larger area between Stampriet and Gochas consist of freehold farm land. The Remainder of Farm Grunewald No. 135 is zoned for agricultural use.

5.4.1.1 Livestock Farming

The Southern Kalahari is suitable for livestock farming and sheep farming is predominant in the area. The Remainder of Farm Grunewald No. 135 is used for sheep farming and the farm is fenced in with livestock fencing.

5.4.1.2 Irrigation

Compared to other countries, the environmental conditions of Namibia are generally poor suited for agricultural production. The main constraints are water shortage and soils that are low in nutrients and the capacity to retain water.

Farms along the Auob River has, however, been developed for small scale irrigation farming, due to the availability of underground water throughout the year. Special measures are required to enhance production under the challenging environmental circumstances.

Four central pivot irrigation fields (two of 16 ha and two of 20 ha) were developed in the north-eastern part of the Remainder of Farm Grunewald No. 135.

5.4.1.2.1 Loss of Agricultural Grazing Land

The development of irrigation fields will result in loss of biodiversity in the natural environment. The irrigation development comprises in total 72 ha of the farm of 4559.1 ha (i.e. 1,58 %), which will not compromise grazing.

5.4.2 PROTECTED AREAS

Hardap Recreation Resort is the nearest protected area, situated around the Hardap Dam. It is located to the west of the Project Site (Refer to Fig. 5.1) and upstream of the nearest ephemeral rivers as well as on the western side of the SAB (Refer to Fig. 5.5). It covers an area of 25 000 ha that represents *Dwarf Shrubland Savannah* and to a smaller degree *Southern Kalahari*.

5.4.2.1 Loss of Protected Areas

The protected area approximately 60 km to the west of the farm is located up-stream of the irrigation development and will not be affected by the activities of the proposed Project or increased water abstraction.

5.5 VISUAL AESTHETICS AND SENSE OF PLACE

5.5.1.1 Status Quo

The visual aesthetics and sense of place in the natural environment of the Remainder of Farm Grunewald No. 135 is typical Kalahari veld with red sand, waving grass, shrubs, Shepherd and Camelthorn trees.

Photo 5.8 – *Natural Kalahari sandveld*

Irrigation development change the sense of place in the Kalahari savannah. The longitudinal dune system, however, hide irrigation fields within the valleys between dunes. The total changed surface area add up to 72 ha of the 4559.1 ha farm. The 4487.1 ha to the south of the irrigation development in the north-eastern corner of the farm will remain natural vegetation for livestock farming.

Photo 5.9 – *Irrigation development in the Southern Kalahari Biome*

5.6 SOCIO-ECONOMIC ENVIRONMENT

The Hardap Region is located in the southern parts of Namibia and have a population size of 79 507 with an annual growth rate of 1.5 % from 2001 – 2011. 60 % of the population in the region are situated in urban areas and 40 % in rural areas. The population density is 0.7 people per m^2. Main languages spoken in the region are Nama/Damara and Afrikaans with a literacy rate of 91 %. Sources of income are Salary and Wages (64.2%), Old age pension (13.4%) and Farming (6.9%) (*NSA, 2012*).

Approximately 35,000 people live in the Stampriet Artesian Basin (SAB) in Namibia. They extract groundwater from aquifers in the SAB for their domestic water supply, their livestock production and for irrigation. The great majority of the local population is dependent on farming for its livelihood. Hardap region contributes to 19.4 % of the country's livestock production.

Although most crop production in Namibia by far takes place adjacent to the perennial rivers on the northern and southern borders, 3.3% of the country's crop production are done in the Hardap region next to the Harap-, Naute-, Oanob, a few smaller private dams and in areas where sufficient groundwater is available, such as the Project area. The extension of the national electricity supply network to this area has increased the economic viability of irrigation farming, and further expansion will be limited only by the availability of water. Almost no groundwater is used for industrial purposes.

Groundwater for domestic purposes in larger towns in the area is extracted from the Auob Aquifer. Only the town of Koës in the south uses water from the Nossob Aquifer. The subartesian aquifers at Aminuis have maintained their yields over many years, but other boreholes in the same aquifer have lower yields. At Leonardville, over-extraction has caused a large local drop in the water table, but at Aranos in the northwest the aquifer continues to supply sufficient water of good quality (although fine sand entering the boreholes causes operational problems). The town of Gochas formerly obtained water from the Auob Aquifer, but this groundwater gradually became contaminated with salt water from the overlying 150 m thick Kalahari Aquifer, and it proved necessary to move the boreholes to a more suitable well field some 10 km to the north (*Alker, 2007*).

Stakeholders in the area will have to determine the ecological and social sustainability of available water in the SAB.

6 PUBLIC CONSULTATION

Public consultation and participation are an important aspect of an EA process. During public consultation, potential impacts that the proposed project may have on the natural and/or socio-economic environments, were identified. Consultation with Interested and Affected Parties (I&APs) and relevant Authorities enables transparent decision-making.

This chapter describes in detail the full extent of the public consultation process that was followed and the I&APs and authorities that were notified of the study being undertaken. It also includes the main issues and concerns raised during the public consultation process and comments received on the Background Information Letter (BIL) distributed during the first round of public consultation.

Public consultation for the purposes of this project was done as prescribed by Regulations 21 to 24 of the Environmental Impact Assessment Regulations (GN. 30 of 2012).

6.1 PUBLIC ENGAGEMENT

6.1.1 FIRST ROUND OF CONSULTATIONS

Engagement with the public and authorities as part of the first round of public consultation commenced on the 06th of July 2022 and concluded on the 27th of July 2022. During the first round of consultation, I&APs and authorities were given an opportunity to register and submit comments and/or concerns on the proposed project.

6.1.1.1 Activities of Public Engagement

Activities undertaken to date to ensure effective and adequate I&AP involvement, are as follows:

- A list of predetermined I&APs and authorities was compiled. A total of 44 I&APs were included on the database (Appendix F1).
- A notification email (Appendix F2) with Background Information Letter (BIL) (Appendix F3) was send to all pre-identified I&APs and authorities (Appendix F1) on 06 July 2022.
- Notification letters (Appendix F4) with BIL (Appendix F3) was hand delivered on 06 July 2022 (Appendix F5) to line ministries (Appendix F1) and State Owned Enterprises situated in Windhoek.
- Notification letters with BIL (Appendix F3) was sent via courier (Appendix F6) to the Regional and Local Authorities (Appendix F7) on 05th July 2022.
- Notification letters (Appendix F8) with BIL (Appendix F3) was sent via registered post (Appendix F9) to the neighbouring farm/property owners on 05th of July 2022.

- Public notices announcing the commencement of the EA and an invitation to register as an I&AP were placed in 'The New Era' and 'Die Republikein' newspapers on 06 July 2022 and 13 July 2022 (Appendix F10).
- A notice board (with the dimensions 60cm x 42cm) was placed at the Hardap Regional Council, the Mariental Rural Constituency office and at the Stampriet Village Council office notice board (Appendix F11). An On-site notice was placed at the Rem. Farm Grunewald No. 135 gate entrance area (Appendix F12).

6.1.1.2 Comments Received and Response Provided

All comments and feedback received from I&Aps and Authorities are summarised in Table 6.1 below. A total 56 I&AP were pre-identified and contacted.

Table 6-1: Comments received during the first round of public consultation

NO.	NAME	COMMENTS	NAME	RESPONSE
1.	Ministry of Urban and Rural Development – Frieda Sindano (06/07/2022)	Dear Mr. van Zyl We acknowledge, with thanks, receipt of your letter dated 05 July 2022 on the above-captioned subject matter. Your letter has been forwarded to Mr. Big Don Kondunda, Director: Habitat and Housing Development for his required attention and action. Mr. Kondunda can be reached at 061 297 5062/5017 and email dkondunda@murd.gov.na. Frieda Sindano Control Administrative Officer Tel: 061 – 297 5283 / Fax: 061 – 258131/ Email: fsindano@murd.gov.na	Urban Green cc	
2.	Ministry of Agriculture, Water and Land Reform – Johanna Aipanda – Nambala (07/07/2022)	Dear Mr. Van Zyl Kindly note that your letter with the above subject is hereby acknowledged with thanks. This letter has been forwarded to Ms. Maria Amakali. Therefore for any queries or follow-up kindly contact her office on the above email addresses or on her office numbers 0812900823 / 061 - 208 7159. Ms. Kalinga copied in this email is	Urban Green cc	

NO.	NAME	COMMENTS	NAME	RESPONSE
		the secretary's for Ms. Amakali. Thanks and kindest regards, Johanna Aipanda - Nambala		
3.	Roads Authority – Elina Lumbu (21/07/2022)	Good day Ms Bashir The Roads Authority wish to register and comment on the subject matter, but unfortunately the information is not provided in detail. We got no idea as to what activities takes place during the water extraction and how these activities might affect the road. How far are the boreholes from the road? Kindly send us the Environmental impact assessment report. Kind Regards Elina Lumbu	Urban Green cc (22/07/2022)	Dear Ms Lumbu, The above mentioned subject refers. Thank you for your response and enquiry. The Remainder of Farm Grunewald No. 135 currently have two centre pivot irrigation fields (16 ha each) that are being cultivated from water extracted from two boreholes (WW200904 and WW203399) with an abstraction Permit Number 10785. The use of another two centre pivot irrigation fields of 20 ha each are proposed on two additional existing boreholes (WW204682 and WW204683) that now require a permit for water abstraction. The water will be used for cultivation of maize and wheat. Attached is a map to show the locality of existing and potential irrigation fields with reference to the C15 (that runs between Stampriet and Gochas) and the farm homestead. The current access road stretches for

NO.	NAME	COMMENTS	NAME	RESPONSE
				approximately 1-2 km from the C15 to the homestead of the farm. No new access or roads are required for the expansion of the irrigation fields to the south-west of the homestead. The second map shows the location of boreholes on the farm. Please do not hesitate to ask for any further information required. Kind regards Julia L. Bashir

6.1.2 SECOND ROUND OF CONSULTATIONS

Engagement with the public and authorities as part of the second round of public consultation commenced on the 10th of August 2022 and concluded on the 17th of August 2022. During the second round of consultation, I&APs and authorities were given an opportunity to submit comments for consideration and inclusion.

6.1.2.1 Activities of Public Engagement

Activities undertaken to date to ensure effective and adequate I&AP involvement, are as follows:

- A notification e-mail (Appendix F15) with Draft Scoping Report was send to all I&APs and authorities on 10 August 2022.

6.1.2.2 Comments Received and Responses Provided

No comments were received during the second round of public consultation.

7 ASSESSMENT OF ENVIRONMENTAL ISSUES, POTENTIAL IMPACTS AND MITIGATIONS

This chapter provides a description and assessment of the key issues of concern and potential impacts associated with irrigation development and increased groundwater abstraction. Mitigation measures relevant to the Project as appropriate are recommended. These measures are aimed at avoiding, minimising or rehabilitating negative impacts or enhancing potential benefits. The significance of potential impacts without and with mitigation is also provided.

The Environmental Assessment Process consisted of two phases, the first being the screening phase and the second the scoping phase, as explained below.

7.1 SCREENING PHASE METHODOLOGY

Each of the potential impacts identified during public consultation and the scoping assessment was screened according to a set of questions (Figure 7.1), which resulted in highlighting the key impacts requiring further assessment.

This list of impacts that were subjected to a scoping assessment is presented in Table 7.2, 7.3, and 7.4, below, as per the evaluation criteria presented in Table 7.1.

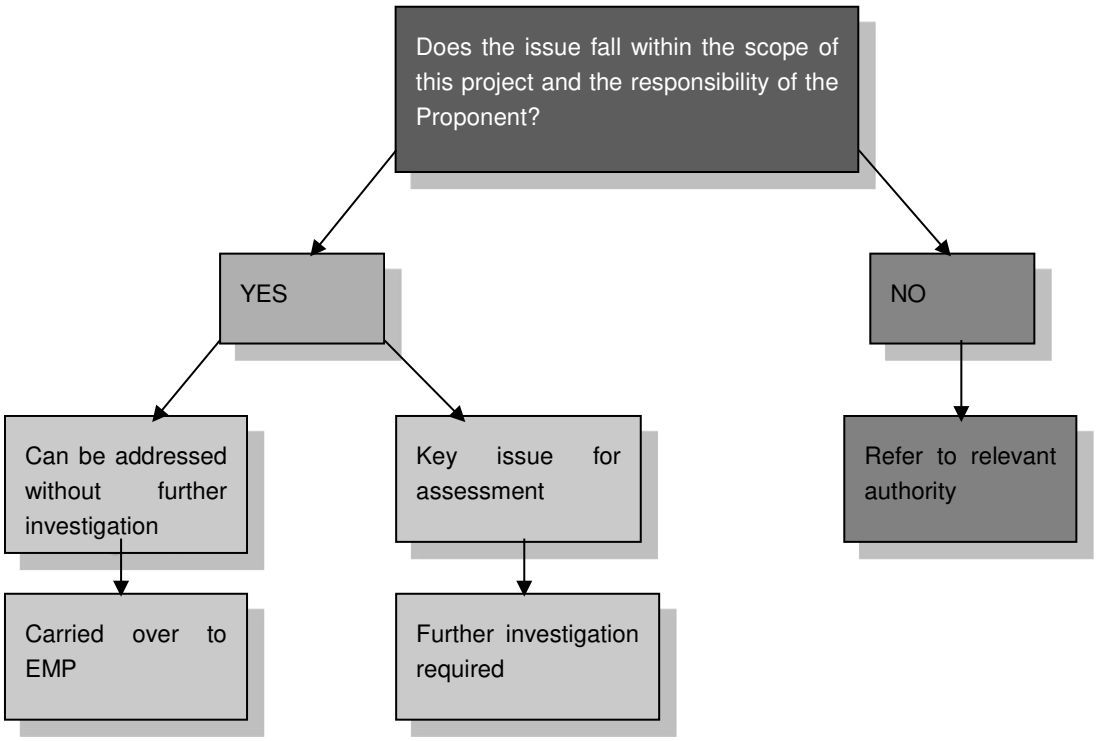

Figure 7.1: *Screening process for determining key impacts*

7.1.1 POSITIVE IMPACTS

The following positive impacts where identified during the screening process and should be mentioned for consideration during the Environmental Assessment:

7.1.1.1 Contribution to National Agricultural Policy

Please refer to Section 4.1.2 where the Namibia Agriculture Policy 2015 is examined. This project is in line with the strategy to focus on increased agricultural production, agro-processing and marketing as well as real farm income as a contribution to national household food security. The Project has the potential to develop the agriculture sector across the value chain and accelerate agricultural contribution to the National Growth Domestic Product.

7.1.1.2 Contribution to National Food Security

The Project will contribute positively to the country's food security programme by delivering wheat and maize to the Namib Mills process plant in Mariental.

7.1.1.3 Socio-Economic Benefits

The Remainder of Farm Grunewald No. 135 currently provide employment to 7 permanent employees and 6 temporary seasonal jobs on an ad hoc basis as and when required. It is

envisaged that another 4 permanent employees will be required for the expansion of the irrigation farming as well as additional temporary help in the harvesting season or as required for crop production. This contributes positively to job creation to the community of Witkrans in the Hardap Region from where labour is sourced and where little other economic activities take place.

7.1.1.4 Capital investment

The development of the Remainder of Farm Grunewald No. 135 means capital investment in the agricultural sector of the Hardap region.

7.2 SCOPING ASSESSMENT METHODOLOGY

The key impacts, identified after carrying out screening (see Section 7.1 above), were evaluated in terms of extent (spatial scale), duration (time scale), intensity (magnitude) and probability. The means of arriving at the different significance ratings is explained in Table 7.1 below.

These criteria are used to ascertain the *significance* of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place. The significance of an impact is derived by considering the temporal and spatial scales and magnitude. Such significance is also informed by the context of the impact, i.e. the character and identity of the receptor of the impact.

Table 7.1: *Criteria for impact evaluation*

CRITERIA	CATEGORY
Impact	This is a description of the expected impact
Nature	**Positive** – environment overall will benefit from the impact
	Negative – environment overall will be adversely affected by the impact
	Neutral – environment overall will not be affected
Extent	**Site Specific:** Expanding only as far as the activity itself *(onsite)*
	Local: Restricted to immediate environment within 5 km of the site
	Regional: Within the Hardap region
	National: Within Namibia
Duration	Reviews the lifetime of the impact, as being -
	Very short – days, <3 days

CRITERIA	CATEGORY
	Short - days, <1 month) **Medium** - months, <1 year **Long** - years, 1 -10 years **Permanent** - >10 years
Intensity	Establishes whether the magnitude of the impact is destructive or innocuous and whether it exceeds set standards, and is described as – **None** (No environmental functions and processes are affected); **Low** (Environmental functions and processes are negligibly affected); **Medium** (Environment continues to function but in a noticeably modified manner); **High** (Environmental functions and processes are altered such that they temporarily or permanently cease and/or exceed legal standards/requirements).
Probability	Considers the likelihood of the impact occurring and is described as – **Improbable** (low likelihood), **Probable** (distinct possibility), **Highly probable** (most likely) or **Definite** (impact will occur regardless of prevention measures).
Significance (no mitigation)	**None** (A concern or potential impact that, upon evaluation, is found to have no significant impact at all) **Low** (Any magnitude, impacts will be localised and temporary. Accordingly, the impact is not expected to require amendment to the project design) **Moderate** (Impacts of moderate magnitude locally to regionally in the short term. Accordingly, the impact is expected to require modification of the project design or alternative mitigation) **High** (Impacts of high magnitude locally and in the long term and/or regionally and beyond. Accordingly, the impact could have a "no go" implication for the project unless mitigation or re-design is practically achievable)
Mitigation	Description of possible mitigation measures
Significance (with	**None** (A concern or potential impact that, upon evaluation, is found to have no

CRITERIA	CATEGORY
mitigation)	significant impact at all) **Low** (Any magnitude, impacts will be localised and temporary. Accordingly, the impact is not expected to require amendment to the project design) **Moderate** (Impacts of moderate magnitude locally to regionally in the short term. Accordingly, the impact is expected to require modification of the project design or alternative mitigation) **High** (Impacts of high magnitude locally and in the long term and/or regionally and beyond. Accordingly, the impact could have a "no go" implication for the project unless mitigation or re-design is practically achievable)
Confidence level	The degree of confidence in the predictions, based on the availability of information and specialist knowledge. **Low** (based on the availability of specialist knowledge and other information) **Medium** (based on the availability of specialist knowledge and other information) **High** (based on the availability of specialist knowledge and other information)

The decision as to which combination of alternatives and mitigation measures to apply lies with the proponent, and their acceptance and approval ultimately with the relevant Competent Authority.

7.3 MITIGATION APPLICATION METHODOLOGY

There is a hierarchy of actions which can be undertaken to respond to any development or activity. These cover avoidance, minimisation and compensation. It is possible and considered sought after to enhance the environment by ensuring that positive gains are included in the development. If negative impacts occur then the hierarchy, as a guiding philosophy, recommends the following steps.

Impact avoidance: This step is most effective when applied at an early stage of project planning. It can be achieved by:

1. not undertaking certain actions or elements that could result in adverse impacts;
2. avoiding areas that are environmentally sensitive; and
3. putting in place preventative measures to stop adverse impacts from occurring.

Impact minimisation: This step is usually taken during impact identification and prediction to limit or reduce the degree, extent, magnitude, or duration of adverse impacts. It can be achieved by:

4. scaling down or relocating the proposal;

5. redesigning elements of the project; and
6. implementing mitigation measures to manage the impacts.

Impact compensation: This step is usually applied to remedy unavoidable residual adverse impacts. It can be achieved by:

7. rehabilitation of the affected site or environment, for example, by habitat enhancement;
8. restoration of the affected site or environment to its previous state or better; and
9. replacement of the same resource values at another location (off-set), for example, by wetland engineering to provide an equivalent area to that lost to drainage or infill.

7.4 POTENTIAL IMPACTS IDENTIFIED AND ASSESSED

The information presented in this section has mainly been drawn from the Proponent's information regarding the proposed irrigation expansion, specialist studies and public engagement that was undertaken as part of this phase of the EIA process.

Table 7.2 presents the potential impacts that might occur during irrigation field expansion, preparation and cultivation, while Table 7.3 to Table 7.11 presents each potential impact and outcome in detail.

All impacts can be viewed as negative, unless otherwise mentioned. Positive impacts have been listed in Section 4.5 and 7.1.1.

Table 7.2 - *Potential impacts to consider:*

IMPACT	CAUSE
Loss of Biodiversity and Habitat Destruction	Clearing of natural vegetation for monoculture irrigation fields
	Illegal removal of protected plants
	Trenching to lay pipes
	Tracks and roads to centre pivot irrigation fields
	Proliferation of invertebrate and vertebrate pests and disease carriers
	Over administration of herbicides and pesticides
	Dust
Groundwater Reduction	Over abstraction of groundwater from the SAB for irrigation
	Unacceptable high levels of consumption
	Wastage
Groundwater Pollution	Inputs of salts, agrochemicals and chemical contaminants

	Salinization of water
	Hazardous material & liquid disposal from tractors and motors
	Waste disposal
Soil degradation	Soil erosion and sedimentation through run-off
	Waterlogging
	Salinization of soil
Heritage and Archaeological Resources	Removal and/or disturbance
Socio-Economic	Operational Health and Safety around heavy vehicle equipment
Visual impact	

7.4.1 LOSS OF BIODIVERSITY AND HABITAT DESTRUCTION

As all developments have potential negative environmental consequences, identifying the most important faunal species including high risk habitats beforehand, coupled with environmentally acceptable mitigating factors, lessens the overall impact of such development.

In the *Southern Kalahari* biome overall terrestrial diversity and endemism is low (see Section 5.3). The expansion of irrigation fields results in damage to existing natural vegetation and replacing it with homogenous crop species.

7.4.1.1 Flora

Protected tree species identified on site are Camelthorn trees (*Acacia erioloba*) and Shepherd's trees (*Boscia albitrunca*). These are protected under the Forestry Act No. 12 of 2001 and a permit from the Ministry of Environment, Forestry and Tourism is required to remove any of these. These trees are abundant on the rest of the farm and in the general area. Removal of protected species can be mitigated by replacing removed trees with new ones. This can be done by simply germinating seeds gathered form existing trees and planting them under suitable conditions. They are well adapted to the area and should establish well during the following rainy seasons. Replacement can also be undertaken in conjunction with a local nursery or in consultation with the National Botanical Research Institute of Namibia.

No new **roads** are required for irrigation expansion and existing roads on the farm can accommodate tractors and 4 x 4 trucks required for cultivation and harvesting.

Monoculture, intensive crop production with a short fallow period may create favourable environment for **pest and diseases** to move in. Knowledge and implementation of Integrated Pest Management (IPM) would be required to address possible pest and diseases immediately when detected.

The accumulation of **dust** particles and formation of a cementitious layer on plant leaves may affect photosynthesis, respiration and transpiration of some flora species. Leaves covered with dust receive less light for photosynthesis; which interferes with gas exchange between the leaf and air. The reduction of leaf stomatal conductance influences plant biomass formation and yield. Leaf cells and the cell structure can also get damaged, due to excessive dust deposition. Plant communities may consequently be affected so that community structure is altered. Dust can also have a negative impact on agriculture, including reducing crop yields by burying seedlings, causing loss of plant tissue, reducing photosynthetic activity and increasing soil erosion.

The chosen centre pivot irrigation system will automatically provide the necessary mitigation for dust control, because of their ability to administer the correct amount of water for maximum absorption and protection against drought. Pesticide and herbicide can also be administered through the pivot system to supply the right amount for pest control, without wastage.

Table 7.3 below presents the comprehensive assessment outcome.

Table 7.3: *Impact assessment pertaining to loss of biodiversity and habitat destruction - flora*

CRITERIA	DESCRIPTION
Risk Event	**Loss of Biodiversity and Habitat Destruction - Flora**
Nature of Impact	Negative
Extent	Local
Duration	Temporary
Intensity	Low
Probability	Highly probable
Significance (no mitigation)	Moderate
Mitigation	Where possible avoid the removal and/or damaging of protected flora potentially occurring in the general area – e.g. *Acacia erioloba*, *Boscia albitrunca*, etc.; If protected species must be removed, obtain a permit from MEFT; Replace damaged/removed tree species in suitable conditions; Remove all invasive alien species on site – e.g. *Prosopis spp*. This would not only indicate environmental commitment, but actively contribute to a better ecology and watershed management; Avoid introducing ornamental plants should landscaping be attempted, especially potential invasive alien species, but rather use localised indigenous species, which would also require less maintenance (e.g.

CRITERIA	DESCRIPTION
	water); Make use of existing tracks/roads as much as possible; Do not drive randomly throughout the area (could cause damage to unique flora, cause accidental fires or erosion related problems); Ensure that adequate firefighting equipment (e.g. fire beaters; extinguishers, etc.) is available; Implement dust control during fallow periods through the centre pivot irrigation system; Use cover crops like grasses or legumes to help reduce wind erosion during fallow periods. Avoid ploughing if the soil is dry or in windy conditions; Planting must occur shortly after ploughing.
Significance (with mitigation)	Low
Confidence level	High
Legal Implications	Forest Act No. 12 of 2001, as amended Nature Conservation Ordinance No. 4 of 1975, as amended

The findings of the Ecological study were that the vegetation clearance of the four irrigation fields of 72 ha are not expected to impact the *Southern Kalahari* biome as a whole, and/or any unique spp. due to the location of the site.

7.4.1.2 Fauna

The expansion of irrigation fields was done in the inter-dune valley area (“street”) between two consecutive longitudinal dunes, which do not harbour special habitat of significance. According to the Ecology study, other than **local habitat alteration/destruction**, the irrigation fields are not expected to have a major influence to any of the reptiles, amphibians, avifauna or mammals. The irrigation fields leave a small footprint and would not impede animal movement.

Species most likely to be affected by habitat destruction are reptiles and rodents, especially burrow living animals. Habitat destruction will also take place where Camelthorn trees with nests of sociable weavers must be removed. Refer to Photo 5.7 in Section 5.3.2.4. Relocation for all these species are possible within the farm and general area.

Routine measures to address herbivory, seed predation and interspecific competition involves the administration of **herbicides and pesticides**. These have the potential to affect not only the target group, but have spill over effects on the ecosystem and may cause mortality in secondary consumers where invertebrate organisms are a food source for a large number of vertebrates.

Table 7.4: *Impact assessment pertaining to loss of biodiversity and habitat destruction - fauna*

CRITERIA	DESCRIPTION
Risk Event	**Loss of Biodiversity and Habitat Destruction - Fauna**
Nature of Impact	Negative
Extent	Local
Duration	Temporary
Intensity	Low
Probability	Highly probable
Significance (no mitigation)	Low
Mitigation	Select storage site and other temporary lay over sites for fertilisers and produce with care to avoid unnecessary damage to habitat; Select the same site for all of the above to make the footprint of damage as small as possible; Provide proper ablution for workers to avoid faecal pollution around irrigation fields; Initiate a suitable and appropriate refuse removal policy as littering could result in certain animals becoming accustomed to humans and associated activity and result in typical problem animal scenarios – e.g. baboon, black-backed jackal, crows, etc.; Do not drive randomly throughout the area (could cause mortalities to vertebrate fauna); Avoid off-road driving at night as this increases mortalities of nocturnal species; Avoid and/or limit the use of lights during nocturnal exploration activities as this could influence and/or affect various nocturnal species – e.g. bats and owls, etc. Use focused lighting for least effect; Prevent the killing of species viewed as dangerous – e.g. various snakes; Prevent the setting of snares for ungulates (i.e. poaching), collection of veld foods (e.g. tortoises, chameleon, etc.) and or any form of illegal hunting activities; Implement and maintain off-road track discipline with maximum speed limits (e.g. 30km/h) as this would result in fewer faunal mortalities and limit dust pollution;

CRITERIA	DESCRIPTION
	Implement a Pest Monitoring System and Integrated Pest Management that blends all available management techniques using chemical and non-chemical into one strategy; Apply herbicides/pesticides through the centre pivot system as far as possible; Use pesticides only when pest damage exceeds an economic threshold; Use bio-degradable and environmentally acceptable chemicals as far as possible; Use herbicides/pesticides with low toxicity outside target groups, with short half-lives and high levels of absorption; Do not apply herbicides/pesticides on windy days to prevent overspray into adjacent indigenous habitats.
Significance (with mitigation)	Low to none
Confidence level	High
Legal Implications	Nature Conservation Ordinance No. 4 of 1975, as amended

The actual development area (footprint) will be relatively small in an area with low endemism and therefore only have localised negative impacts on the environment and associated fauna. The impact associated with habitat destruction and loss of biodiversity is expected to have a ***low*** significance rating prior to mitigation and ***low – none*** after mitigation.

7.4.2 GROUNDWATER REDUCTION

Groundwater **over abstraction** can be defined as abstracting more than the natural inflow/recharge to the aquifer, thus groundwater outflow is greater than groundwater inflow. Since *in situ* groundwater is an invisible source, sustainable exploiting thereof can only be observed through monitoring groundwater rest levels in conjunction with monitoring abstraction volumes and -rates. Consequently, improvements in groundwater management and monitoring of the SAB by stakeholders on the Namibian side were implemented and has been intensified in order to acquire reliable data as a basis for development decisions.

Good progress has been made in understanding the recharge mechanisms in the north-western and western part of the basin (farm Grunewald is situated in the latter). Focused recharge in the region takes place through sinkholes and geological fault lines. It has unfortunately remained difficult to come to definitive conclusions about levels of recharge to the upper layers and the artesian layers.

Unless a groundwater balance is established, thus providing an accurate estimation of the surplus volume of groundwater available for abstraction, managing groundwater's sustainable use is reactionary, i.e., one will only realise over abstraction occurs once the rest water levels start deepening. Refer to Appendix D, Table 2 for depth-related information on the boreholes on the Remainder of Farm Grunewald No. 135, including the rest water levels, measured during the February 2022 down-hole camera inspections. These levels can be used as baseline information to monitor groundwater level for this Project.

Over-abstraction may lead to deepening of water levels which may cause a reduction of the pressure in the aquifer. In terms of direct groundwater-related impacts, over abstraction may result in any, or all, of the following:

- Groundwater level drawdown and subsequent deepening of the water table.
- Changes in groundwater flow patterns that can affect groundwater quality distribution in the subsurface.
- Reduced borehole yields.
- Increased pumping heads.
- Longer borehole recovery periods.
- Non-flowing conditions developing in currently flowing artesian boreholes

Table 7.5 below presents the comprehensive assessment outcome.

Table 7.5: *Impact assessment pertaining to Groundwater Reduction*

CRITERIA	DESCRIPTION
Risk Event	**Groundwater Reduction**
Nature of Impact	Negative
Extent	Regional
Duration	Medium
Intensity	Medium
Probability	Probable
Significance (no mitigation)	Moderate
Mitigation	• A groundwater monitoring program must be implemented whereby water levels and abstraction volumes and rates are measured and recorded frequently; • Manage demand and abstraction (reduce abstraction if over abstraction becomes evident); • Implement water conservation measures.
Significance (with mitigation)	Low
Confidence level	Medium

CRITERIA	DESCRIPTION
Legal Implications	Water Act, Act 54 of 1956 Water Resource Management Act No. 11 of 2013 (not effected as yet)

According to the Geohydrology study there is a ***medium to low*** significance of negative impacts being caused by over-exploitation (over-pumping) on the groundwater environment if the monitoring mitigation measures are in place and adhered to.

7.4.3 GROUND WATER POLLUTION

Groundwater pollution can be defined as the direct or indirect alteration of the physical, chemical or biological properties of a water resource. Considering that Namibia is an arid country, which is dependent on limited ground- and surface water, pollution control of this scares natural resource plays a major role in the country's legislation. Pollution of groundwater by mismanagement has widespread and long term impacts which must be avoided. During this Project groundwater may become polluted through:

- **point source and/or diffuse discharges** such as leakage of poorer quality water into the artesian aquifer;
- **leakage of salts, agrochemicals and chemical contaminants** through over administration of fertilizers, herbicides and pesticides;
- **fuel or hazardous substances spills** from heavy machinery used during ploughing and/or harvesting.

As pollution products migrate through the soil, small amounts thereof can be retained by soil particles, known as residual saturation, which can potentially reside in the soil for years and act as a continuing source of contamination. Environmental waste protection protocols must be implemented to ensure that no environmental harm is caused and that appropriate action is taken in any event of a point source and/or diffuse discharges occurring.

The water quality in the SAB changes from fresh to very saline over short distances, both laterally and vertically. **Iron bacteria** seem to be present localised within the soil as well as the groundwater.

The four boreholes to be used for irrigation on the Remainder of Farm Grunewald No. 135 must be sealed-off properly, otherwise these holes may lead to upper Kalahari water (often of poorer quality) leak into the borehole, and/or artesian water may leak into the Kalahari aquifer. The latter is of greater concern. Iron bacteria tends to clog some of the screened sections.

Considering the above, it is recommended that the boreholes be rehabilitated and test pumped after rehabilitation.

Table 7.6: *Impact assessment pertaining to Groundwater Pollution*

CRITERIA	DESCRIPTION
Risk Event	**Groundwater Pollution**
Nature of Impact	Negative
Extent	Local
Duration	Medium
Intensity	Medium
Probability	Probable
Significance (no mitigation)	Moderate
Mitigation	Rehabilitate and Monitor boreholes to be used for irrigation purposes. To limit the potential for spills or leaks from construction machinery and its resultant potential impact on the water quality, the following mitigation measures should be implemented: • Fertilisation must be done taking cognisance of the fact that over-fertilisation can lead to leaching of chemicals into the groundwater environment. • All reasonable measures must be taken to prevent spillage and leakage of materials likely to pollute the aquifer(s). • If a spill (especially of hydro-carbons) occurs, the contaminated soil must be removed immediately and disposed of at an appropriate disposal site. Polluted soil must be remediated where possible. To limit the potential for waste generation and its resultant potential impact on the water quality, the following mitigation measures should be implemented: • Appropriate measures should be taken for the transportation, handling, storage and disposal of ALL waste and hazardous material. • Adapt irrigation practises (including fertilisation, herbicides and pesticides use) to reduce application of potential pollutants. • Reduce volumes / intensity of irrigation water to minimise leaching of pollutants.
Significance (with mitigation)	Low
Confidence level	Medium
Legal Implications	Water Act, Act 54 of 1956 Water Resource Management Act No. 11 of 2013 (not effected as yet)

According to the Geohydrological Study there is a ***low to medium*** probability of negative impacts on groundwater quality caused by the irrigation activities.

Considering the thick, impervious Rietmond Member overlaying the Stampriet Artesian Aquifer, spillages of hazardous pollutants such as hydrocarbons from fuel or oil spillages will most likely have very little, if any all, impact on the artesian aquifer.

However, should a hazardous substances enter any of the boreholes, the impacts could be severe, extent locally and be of high significance.

7.4.4 SOIL DEGRADATION

Soil plays a major role in successful crop production, because it provides the medium for seed germination and root growth. It also provides the ecosystem service of nutrient cycling through the transformation of organic materials by soil organisms and retention and release of nutrients. It further regulates the supply and quality of water by controlling water infiltration and percolation, drainage of excess soil water to groundwater, filtering, buffering and transformation of substances and contaminants in water.

7.4.4.1 Soil Composition

Namibian soils naturally suffer from low organic matter content, due to low plant biomass production under the prevailing arid and semi-arid conditions, as well as rapid mineralisation of organic matter at high soil temperatures.

Soil organic matter and nutrients are further lost when vegetation is cleared and removed from land and when agriculture is practiced on marginal land without sufficient inputs of fertilisers, manure, crop residues or compost. *Calcisols* that occur on the Project Site, generally contain sufficient basic plant nutrients, but the imbalance between the bases suppresses uptake of some of these nutrients by plant roots. The natural vegetation has adapted to local soil conditions, but commercial crops perform poorly in these marginal soils and this is reflected in low crop yields.

This is worsened by removal of crop residues, absence of cover crops and long periods of land lying bare – thus drying out and heating up – between harvest and subsequent planting.

Soil biodiversity suffers from the loss of organic matter, which forms the basis of soil food webs. Overuse of agrochemicals further disrupts soil biotic communities and their breakdown negatively affects the ecosystem services provided by soil.

7.4.4.2 Soil Salinisation

High levels of salt are toxic to plants and causes water stress in plants by hampering uptake of water, even when the actual volume of water in the soil is sufficient. All irrigation water contains some salts, that accumulate in soil over time. Poor drainage conditions, low rainfall and excessive irrigation all contribute to the build-up of salts. Large parts of Hardap Irrigation Scheme experience management-related salinisation. Rehabilitation of saline soils comprise the following:

- irrigation methods that deliver less water directly to plant roots and not raise the water table;
- installing sub-surface drainage systems;

- lowering the groundwater table by growing deep-rooted salt-tolerant crops;
- occasionally flushing the salts beyond the root zone with copious amounts of clean water or alternating strips of crops with 'sacrificial' fallow strips.

7.4.4.3 Soil Compaction

Repeated pressure on the soil surface, such as from heavy agricultural machinery and trampling by grazing animals, especially when the soil is wet, as well as ploughing to a constant depth, break down soil aggregates and compact the soil to form a subsurface 'hardpan' that has very low porosity and permeability. As macropores collapse and become disconnected, the flow of water and air is impeded, thus compaction interferes with aeration, water infiltration, percolation and storage, nutrient uptake, root growth and biological activity.

Topsoil compaction is partly reversible and controllable, but subsoil compaction is cumulative and not completely reversible, as pore function cannot be fully restored. Deep ripping can break up the cement-like hardpan, while adding organic matter, planting deep-rooted trees among crops and using tined tillage instruments, rather than traditional mouldboard ploughs, can help prevent and alleviate compaction.

7.4.4.4 Soil Pollution

Soil pollution refers to accumulation of organic toxins following planting of certain crops, accumulation of excess agro-chemicals (especially pesticides and herbicides), and nutrient imbalances and toxicities arising from using inappropriate types and quantities of fertilisers.

7.4.4.5 Soil Acidification

The sandy *Arenosols* of eastern and north-eastern Namibia have little capacity to hold water or nutrients. The low cation exchange capacity and sandy texture mean that basic cations (calcium, magnesium, potassium, sodium) are easily leached out beyond the reach of plant roots. They are also somewhat acidic. Under intensive crop production, such soils quickly become more acidic through addition of ammonium-based fertilisers and, to a lesser extent, phosphorus and sulphur fertilisers.

Harvesting of crops and removal of their residues effectively takes basic cations out of the system and promote acidification. The problem can be corrected by working agricultural lime into the soil before planting, return of crop residues to the soil, and applying fertilisers in small increments throughout the growing season. Avoid ammonium-based fertilisers to limit further acidification.

For successful crop farming, both water and fertilisers must be applied to these soils as close to the plant roots as possible, for example using drippers, adding fertilisers to irrigation water and applying fertilisers in small doses spaced out through the growing season.

Table 7.7: *Impact assessment pertaining to Soil Degradation*

CRITERIA	DESCRIPTION
Risk Event	**Soil Degradation**
Nature of Impact	Negative
Extent	Local
Duration	Long
Intensity	Medium
Probability	Probable
Significance (no mitigation)	Moderate
Mitigation	Deep ripping is required to break up the cement-like hardpan, Use tined tillage instruments to prevent and alleviate compaction. Add organic matter to the irrigation fields. Work agricultural lime into the soil before planting; Apply fertilisers in small increments throughout the growing season. Avoid ammonium-based fertilisers to limit acidification. Drip or trickle irrigation with small applications of fertilisers must be spaced out through the growing season. Water and fertilisers must be applied as close to the plant roots as possible, for example using drippers, adding fertilisers to irrigation water and applying fertilisers in small doses. Maintaining good vegetation cover and soil organic matter content to protect the soil. Slow down overland flow and enhance infiltration of water into the soil. Do not remove crop residues causing long periods of land lying bare between harvest and subsequent planting. Return crop residues to the soil. Do not overuse agrochemicals since it disrupts soil biotic communities and their breakdown negatively affects the ecosystem services provided by soil. Wind erosion can be minimised by retaining vegetative cover in the form of cover crops, crop residues and mulches to break wind speed at ground level and by planting windbreaks.

CRITERIA	DESCRIPTION
Significance (with mitigation)	Low
Confidence level	High
Legal Implications	Soil Conservation Act No. 76 of 1969, as amended

Soil degradation can have a ***moderate*** impact on the sensitive soil composition of Namibia, but with proper soil monitoring and management it can be reduced to ***low*** significance.

7.4.5 HERITAGE AND ARCHAEOLOGICAL RESOURCES

No signs of archaeological remains were found on the 72 ha developed for irrigation. In the event that buried archaeological remains are detected, which are not visible to surface survey, it must be handled in accordance with the provisions of Part V Section 46 of the National Heritage Act (27 of 2004). The "chance finds" procedure covers the actions to be taken from the discovery of a heritage site or item, to its investigation and assessment by a trained archaeologist or other appropriately qualified person. This process involves the following:

Responsibility:

Operator	To exercise due caution if archaeological remains are found.
Foreman	To secure site and advise management timeously.
Proponent	To determine safe working boundary and request inspection.
Archaeologist	To inspect, identify, advise management, and recover remains.

Procedure:

Action by person identifying archaeological or heritage material:

a) If operating machinery or equipment stop work.

b) Identify the site with flag tape.

c) Determine GPS position if possible.

d) Report findings to an archaeologist.

Table 7.8: *Impact assessment pertaining to Heritage and Archaeological Resources*

CRITERIA	DESCRIPTION
Risk Event	Heritage and Archaeological Resources
Nature of Impact	Neutral
Extent	Site specific
Duration	Medium
Intensity	Low
Probability	Improbable
Significance (no mitigation)	Low
Mitigation	Caution should be exercised if archaeological/heritage remains are discovered during ploughing or tillage. The labourers should receive training with respect to the identification of archaeological/heritage remains and the procedures to follow should such remains be discovered during construction. Any archaeological materials found should be reported to the National Monuments Council, and all on-site activities stopped immediately. Details with regards to the procedure to follow is defined in the EMP
Significance (with mitigation)	None
Confidence level	High
Legal Implications	National Heritage Act (Act 27 of 2004), as amended

The probability of locating important archaeological/heritage remains is unlikely. The impact rating associated with such an event is therefore considered to be ***low*** before mitigation and ***none*** after mitigation.

7.4.6 NATURAL RESOURCES (WATER & ENERGY)

Irrigation through centre pivots require both water and energy of which water is currently the source under pressure. The impact on groundwater abstraction is addressed in Section 7.4.2.

Irrigation will be administrated through centre pivot irrigation systems that have high water use efficiency. The irrigation system applies the right size water drop at the right tempo to ensure the most efficient way to irrigate crops.

NamPower electricity can be supplemented with low carbon solar energy from solar panels on the farm.

Table 7.9: *Impact assessment pertaining to Natural Resources (Water and Energy)*

CRITERIA	DESCRIPTION
Risk Event	**Natural Resources (Water and Energy)**
Nature of Impact	Negative
Extent	Regional
Duration	Medium
Intensity	Low
Probability	Probable
Significance (no mitigation)	Low
Mitigation	Irrigation should be done at appropriate times during the day/night when least evaporation will take place. Appropriate amount of water-use must be determined for irrigation to prevent plant withering or unnecessary run-off water. Day to day leakage checks must be done. There should be no tolerance towards water wastage. Electricity from NamPower should be supplemented by solar energy.
Significance (with mitigation)	Low to None
Confidence level	High
Legal Implications	Water Act No. 54 of 1956, as amended

7.4.7 SOCIO-ECONOMIC

Positive Socio-Economic impacts are also listed in Chapter 4.5 and 7.1.1. Socio-economic impacts associated with irrigation development are:

7.4.7.1 Health &Safety

Operation of heavy vehicles and machinery has the potential for accidental injury, either minor or major accidents, to labourers. On-site safety of all personnel is an important responsibility of the Proponent and should be adhered to in accordance with the requirements of the Labour Act (No 11 of 2007) and the Public Health Act (No. 36 of 1919). Ensuring that the operational activities do not pose any danger to the surrounding community is important.

Table 7.10: *Impact assessment pertaining to health and security*

CRITERIA	DESCRIPTION
Risk event	**Health, Safety and Security**
Nature of Impact	Negative.
Extent	Local
Duration	Very short
Intensity	Low
Probability	Probable
Significance (no mitigation)	Low
Mitigation	Ensure that all labourers and personnel are trained depending on the nature of their work. Provide for a first aid kit and trained person to apply first aid when necessary. Restrict unauthorised access to the irrigation fields. Clearly demarcate dangerous areas and no-go areas on site. The Proponent must comply with all applicable occupational health and safety requirements. The workforce should be provided with necessary Personal Protective Equipment.
Significance (with mitigation)	Low-none
Confidence level	High
Legal Implications	Labour Act (No 11 of 2007) and the Public Health Act (No. 36 of 1919)

These potential impacts hold ***low*** significance and with appropriate Health and Safety mitigations can be reduced to ***low*** or hopefully ***none***.

7.4.8 VISUAL AESTHETICS AND SENSE OF PLACE

The extent to which the proposed Project will have an effect on the visual aesthetics and/or sense of place is determined by the (i) developed/undeveloped status of the site and the area in between the site and the receptor; (ii) larger topography; (iii) density and type of vegetation on-site and in between the site and the receptor; (iv) distance between the site and the receptor; and (v) the nature and scale of the development.

Given the above it is envisaged that the 72 ha centre pivot irrigation fields will not pose a visual impact on the Southern Kalahari landscape. The irrigation fields were developed in flat areas between consecutive longitudinal dunes that would prevent visibility from any area outside the

"street". The centre pivot fields are situated next to the homestead and stores of the farm and forms part of the homestead depiction.

Table 7.11: *Impact assessment pertaining to visual aesthetics and sense of place*

CRITERIA	DESCRIPTION
Risk event	**Visual aesthetics and sense of place**
Nature of Impact	Negative.
Extent	Local
Duration	Permanent
Intensity	Low
Probability	Improbable
Significance (no mitigation)	Low
Mitigation	The natural topography of the area, with longitudinal dunes concealing the flat irrigation fields in the "streets", naturally covers the visual impact that might been seen. None of Portion of Farm Grunewald No. 135 is visible from the C15, again because of the natural topography of the area.
Significance (with mitigation)	Low - none
Confidence level	High

The significance of the visual impact and sense of place of the expansion of irrigation fields on the area is expected to be ***low*** and will remain ***low*** during project life. Mitigation measures for full rehabilitation exist to reduce the significance of the impact after project life to ***none.***

7.4.9 DECOMISSIONING AND CLOSURE

It is the understanding that every Project should have a Project Life, after which rehabilitation to its natural pristine condition should take place. Decommissioning and rehabilitation will be the responsibility of the Proponent. Refer to Section 4.3.5 for the activities to be undertaken during Decommissioning. It should be undertaken according to a Decommissioning & Rehabilitation Plan in consultation with a Botanist or Ecologist to advise on how to go about restoring the area to its pristine condition.

7.5 CUMULATIVE IMPACTS

Any development introduced is expected to place an additional load on existing natural resources and infrastructure and have both positive and negative impacts on the immediate and surrounding environment (natural and social).

The significance thereof is determined by the nature and the scale of the proposed development. An evaluation of the identified impacts that the proposed irrigation development may have on the environment (i.e. natural and social) suggests that it will have a certain potential should none of the mitigations be implemented.

The increase of water abstraction in the Stampriet Artesian Basin will have a cumulative impact on **groundwater reduction and pollution**. The low inherent fertility and composition of Namibian **soils** add a further cumulative impact due to irrigation development.

The SAB may be negatively affected according to climate change projections for eastern Namibia, and currently some cross-border studies are being planned to assess the long-term viability of this aquifer (*Alker, 2007*). Given the scope of expansion on the Remainder of Farm Grunewald No. 135, it has the potential to have a ***moderate*** impact on groundwater reduction and pollution, but with implementing mitigation measures discussed in Section 7.4.2 and 7.4.3 and rigorous monitoring it can be reduced to ***low***.

Cumulative unmitigated impact of **pesticides and herbicides** can be significant. Although the direct impacts may occur within the Project Site only, the project could contribute to the cumulative impact of the irrigation developments along the SAB. Without mitigation the probability associated with the impacts are ***moderate***. With mitigation measures discussed in Section 7.4.1 the probability can be reduced to ***low***.

The cumulative impact of the irrigation expansion development, given its footprint of 72 ha, but in a sensitive arid area, can be expected to be ***Moderate***. With the suggested mitigation measures and meticulous water and soil monitoring by appropriate persons, it can be reduced to ***Low*** or ***None*** if adequate recharge and soil preparation takes place.

8 CONCLUSIONS & RECOMMENDATIONS

This chapter of the report presents the assessment conclusion following the scoping phase, as well as the key recommendations and the environmental statement for consideration by the authorities. The conclusion and recommendations as presented in this chapter have been drawn from the assessment outcome, as presented in Chapter 7.

8.1 CONCLUSIONS

It is the conclusion of the Environmental Scoping Assessment that this project has the potential to contribute positively to the country's food security in a manner that compliments the Namibia Agriculture Policy 2015.

However, Namibia's arid and unpredictable climate, limited water sources, soils with inherently low fertility and poor physical properties are major constraints to limit agricultural development, especially crop farming. Compared to crop farming in more fertile parts of the world, the vast majority of Namibian soils are considered as marginal. Natural vegetation is adapted to local soil conditions, but crops perform poorly in these marginal soils and this is reflected in low yields.

That said, the scoping study indicated that the soil type of the interdune valleys that occur in the SAB area have the potential to overcome the general difficulties experienced in crop farming in other areas of Namibia. Commercial high-input farming technologies can further help overcome these limitations. Extensive capital investment has been untaken on the Remainder of Farm Grunewald No.135 to overcome the environmental constraints. With the mitigation measures as discussed in Chapter 7.4, the Project can minimize negative environmental impacts and with rigorous monitoring of groundwater quantity and quality by the Proponent, the Stampriet Water Basin Committee and the Ministry of Agriculture, Water and Land Reform, impacts on groundwater of the SAB can be detected and addressed.

8.2 RECOMMENDATIONS

Given the above it is recommended that expansion of irrigation development and increased groundwater abstraction from the SAB on the Remainder of Farm Grunewald No. 135 be done with rigorous monitoring of groundwater, soil and financing.

This must be undertaken by the Proponent and monitored by the Stampriet Water Basin Committee and the Ministry of Agriculture, Water and Land Reform. All potential impacts identified in this study on groundwater and soil as well as other impacts that might arise during implementation must be properly identified in time and addressed in an effective manner.

Mitigation measures must be strictly enforced to protect groundwater and soil. Monitoring Programmes on these must be undertaken to address the uncertainties around these impacts. Timeous management practices must be put in place if any detrimental impacts are detected.

It is the opinion of the EAP that further information is not required from a full EIA, but it is recommended that the Project be undertaking in consultation with the Stampriet Water Basin Committee and the Ministry of Agriculture, Water and Land Reform. This will assist to identify over abstraction or groundwater pollution.

This environmental scoping assessment concludes that the intended project should proceed with caution under the following recommendations:

1. All required permits, licenses and approvals (see section 3.4) for the development be obtained.
2. All mitigations listed in Tables 7.2 to 7.11 and the Environmental Management Plan (Appendix G) be implemented prior and during crop production.
3. Continued on-site monitoring of groundwater levels, quality and soil must be undertaken by the Proponent and the Stampriet Water Basin Committee as well as monitoring of the SAB as a whole should be undertaken by the MAWRD.

8.3 ENVIRONMENTAL STATEMENT

Based on the information presented in this scoping report, the Environmental Assessment Practitioner is of the opinion that the immediate and larger environment will not be significantly impacted if the above recommendations as proposed in this report are implemented and monitored, and responsible environmental practises are applied by the Proponent.

Urban Green cc, the independent environmental assessment practitioner, recommends to the relevant authorities that the application for the listed activities associated with the increase water abstraction from the SAB on the Remainder of Farm Grunewald No. 135 be approved on condition that the above recommendations (Section 8.2) are met and that continuous monitoring be conducted in accordance with the Environmental Management Act (Act No. 7 of 2007), its EIA Regulations and this scoping report. It is important that proof of monitoring is submitted to the office of the Environmental Commissioner to be used as part of the review process pertaining to the 3-yearly ECC renewal.

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APPENDIX A

APPLICATION FOR ENVIRONMENTAL CLEARANCE CERTIFICATE

APPENDIX B

CURRICULUM VITAE ENVIRONMENTAL ASSESSMENT PRACTITIONER

APPENDIX C

VALID WATER PERMIT NO. 10785

APPENDIX D

GEOHYDROLOGICAL REPORT

APPENDIX E

ECOLOGY FAUNA AND FLORA SPECIES LISTS

APPENDIX F

PUBLIC PARTICIPATION

APPENDIX G

ENVIRONMENTAL MANAGEMENT PLAN