APP-001301
AGRICULTURAL ACTIVITIES ON FARMS NESEIER, UITKOMS AND BAOBAB, OSHIKOTO REGION

ENVIRONMENTAL ASSESSMENT SCOPING REPORT

Assessed by:

Assessed for:

D J van der Berg

March 2023

Project:	**AGRICULTURAL ACTIVITIES ON FARMS NESEIER, UITKOMS AND BAOBAB: ENVIRONMENTAL ASSESSMENT SCOPING REPORT**	
Report: Version/Date:	Final March 2023	
Prepared for: (Proponent)	D J van der Berg P.O. Box 571 Tsumeb Namibia	
Lead Consultant	Geo Pollution Technologies (Pty) Ltd PO Box 11073 Windhoek Namibia	TEL.: (+264-61) 257411 FAX.: (+264) 88626368
Main Project Team:	**André Faul** (B.Sc. Zoology/Biochemistry); (B.Sc. (Hons) Zoology); (M.Sc. Conservation Ecology); (Ph.D. Medical Bioscience) **Quzette Bosman** (B.A. Geography/Sociology); (B.A (Hons) Environmental Management) **Johann Strauss** (B.A Geography/Psychology/Environmental Management) **Stefan Short** Health and Safety Supervisor / GIS Technician	
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Report Approval	 **André Faul** **Conservation Ecologist**	

I _____ acting as the Proponent's representative (D J van der Berg), hereby confirm that the project description contained in this report is a true reflection of the information which the Proponent has provided to Geo Pollution Technologies. All material information in the possession of the Proponent that reasonably has or may have the potential of influencing any decision or the objectivity of this assessment is fairly represented in this report and the report is hereby approved.

Signed at Tsumeb on the 21 day of April 2023.

D J van der Berg

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EXECUTIVE SUMMARY

D J van der Berg requested Geo Pollution Technologies (Pty) Ltd to undertake an environmental assessment for the existing agricultural activities on Farms Neseier, Uitkoms and Baobab, all being portions of the Farm Ludwigshafen No. 480 close to Tsumeb in the Oshikoto Region. D J van der Berg irrigates 144 ha and mainly produces citrus, carrots, maize, sorghum, radishes and onions. Irrigation is from five production boreholes, by means of mainly centre pivot, micro-sprayer and sprinkler irrigation systems. The boreholes are WW332515, WW32516, WW35787, WW35718 and WW35785. Farms Neseier, Uitkoms and Baobab is GLOBALG.A.P. certified. GLOBALG.A.P. certification aims specifically at good agricultural practices to reduce environmental impacts.

The environmental assessment determines all environmental, safety, health and socio-economic impacts associated with the continued agricultural activities on the farm. Relevant environmental data was compiled by making use of secondary data and from a reconnaissance site visit. Potential environmental impacts and associated social impacts were identified and are addressed in this report.

The surrounding land use is agriculture, similar to Neseier, Uitkoms and Baobab. Due to the nature and location of the farm, limited impacts are expected on the surrounding environment. The environmental management plan must still be implemented and monitoring of environmental performance is recommended to ensure regulatory compliance and that corrective measures be taken if necessary. The agricultural activities on the farm plays a role in contributing to the agricultural and food sector by growing produce for local and international markets. It further provides employment opportunities and generates revenue on both local and international markets.

The major concerns related to the operations of the farm are that of potential groundwater, surface water and soil contamination, groundwater over-abstraction, the possibility of fire, production of waste and health and safety of staff. By appointing local contractors and employees, and by implementing educational programs, the positive socio-economic impacts can be maximised while mitigating negative impacts.

Implementing a safety, health, environment and quality (SHEQ) policy will contribute to effective management procedures, to prevent and mitigate impacts. Adherence to all regulations relating to the agricultural sector and health and safety are paramount. All forms of soil and groundwater pollution must be prevented. Fire prevention is important and fire response plans must be in place and regular firefighting training provided. All staff should be educated on the importance of biodiversity and poaching or illegal harvesting of animal and plant products prohibited. A site-specific waste management plan can guide the disposal of both hazardous and non-hazardous waste. It should include waste reduction and recycling measures and the disposal of different forms of waste at appropriately classified waste disposal facilities. A monthly groundwater monitoring and review process is crucial and must preferably be conducted in conjunction with other farmers in the area. This will act as an early warning system should over-abstraction occur, especially during dry seasons.

The environmental management plan included in Section 10 of this document acts as an on-site reference document, used during all phases (planning, construction, operations and decommissioning) of the farm. All monitoring and records kept should be reported on to ensure compliance with the environmental clearance certificate conditions. Parties responsible for transgression of the environmental management plan should be held responsible for any rehabilitation that may need to be undertaken. The SHEQ policy must accompany the environmental management plan and the contents communicated to all employees and contractors. Adherence to local or national regulations and guidelines, as outlined in the environmental management plan, is important, and monitoring of the same must be performed.

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LIST OF ABBREVIATIONS

AEZ	Agro-Ecological Zone
AIDS	Acquired Immune Deficiency Syndrome
BE	Biological/Ecological
DWA	Department of Water Affairs
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EMA	Environmental Management Act No 7 of 2007
EMP	Environmental Management Plan
EMS	Environmental Management System
EO	Economic/Operational
ES	Environmental Classification
GDP	Gross Domestic Product
GPT	Geo Pollution Technologies
HIV	Human Immunodeficiency Virus
IAPs	Interested and Affected Parties
IUCN	International Union for Conservation of Nature
LNAPL	Light Non-Aqueous Phase Liquids
mamsl	Meters Above Mean Sea Level
m/s	Metre per second
mbs	Metres below surface
MEFT	Ministry of Environment, Forestry and Tourism
mm/a	Millimetres per annum
MSDS	Material Safety Data Sheet
NDP	National Development Plan
PC	Physical/Chemical
PPE	Personal Protective Equipment
ppm	Parts per million
SANS	South African National Standards
SC	Sociological/Cultural
SHEQ	Safety, Health, Environment and Quality
UNFCCC	United Nations Framework Convention on Climate Change
WHO	World Health Organization

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.

Competent Authority - means a body or person empowered under the local authorities act or Environmental Management Act to enforce the rule of law.

Construction - means the building, erection or modification of a facility, structure or infrastructure that is necessary for the undertaking of an activity, including the modification, alteration, upgrading or decommissioning of such facility, structure or infrastructure.

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.

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, palaeontological or social values".

Environmental Impact Assessment (EIA) - process of assessment of the effects of a development on the environment.

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

Environmental Management System (EMS) - An Environment Management System, or EMS, is a comprehensive approach to managing environmental issues, integrating environment-oriented thinking into every aspect of business management. An EMS ensures environmental considerations are a priority, along with other concerns such as costs, product quality, investments, PR productivity and strategic planning. An EMS generally makes a positive impact on a company's bottom line. It increases efficiency and focuses on customer needs and marketplace conditions, improving both the company's financial and environmental performance. By using an EMS to convert environmental problems into commercial opportunities, companies usually become more competitive.

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

GLOBALG.A.P - a brand of smart farm assurance solutions developed by FoodPLUS GmbH in Cologne, Germany, with cooperation from producers, retailers, and other stakeholders from across the food industry. These solutions include a range of standards for safe, socially and environmentally responsible farming practices. The most widely used GLOBALG.A.P. standard is Integrated Farm Assurance (IFA), applicable for fruit and vegetables, aquaculture, floriculture, livestock, and more. This standard also forms the basis for the GGN label: The consumer label for certified, responsible farming and transparency.

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 (IAP) - 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.

Proponent (Applicant) - 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 & 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.

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, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

Stakeholder Engagement - The process of engagement between stakeholders (the Proponent, authorities and IAPs) 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".

Stakeholders - A sub-group of the public whose interests may be positively or negatively affected by a proposal or activity and/or who are concerned with a proposal or activity and its consequences. The term therefore includes the Proponent, authorities (both the lead authority and other authorities) and all interested and affected parties (IAPs). The principle that environmental consultants and stakeholder engagement practitioners should be independent and unbiased excludes these groups from being considered stakeholders.

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" – the definition of the World Commission on Environment and Development (1987). "Improving the quality of human life while living within the carrying capacity of supporting ecosystems" – the definition given in a publication called "Caring for the Earth: A Strategy for Sustainable Living" by the International Union for Conservation of Nature (IUCN), the United Nations Environment Programme and the World Wide Fund for Nature (1991).

1 BACKGROUND AND INTRODUCTION

D J van der Berg (the Proponent) appointed Geo Pollution Technologies (Pty) Ltd to undertake an environmental assessment for the agricultural activities on three portions of farm Ludwigshafen no. 480. Individually the portions are called Neseier (Portion 8), Uitkoms (Potion 11) and Baobab (Portion 24). Together they form one farming unit which is located near Tsumeb in the Oshikoto Region (Figure 1-1). The Proponent irrigates 144 ha for the production of mainly citrus, carrots, maize, sorghum, radishes and onions. Irrigation is from five production boreholes, by means of mainly centre pivot, micro-sprayer and sprinkler irrigation systems. The main operational activities include:

- land preparation;
- planting;
- water abstraction and irrigation;
- fertilizer application and pest control;
- harvesting; and
- processing and packaging.

The potential impacts of the operations, maintenance / construction, and possible decommissioning phases of the project on the environment were determined through the risk assessment as presented in this report. The environment being defined in the Environmental Management Act as "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".

The environmental assessment was conducted to apply for an environmental clearance certificate in compliance with Namibia's Environmental Management Act (Act No 7 of 2007) (EMA).

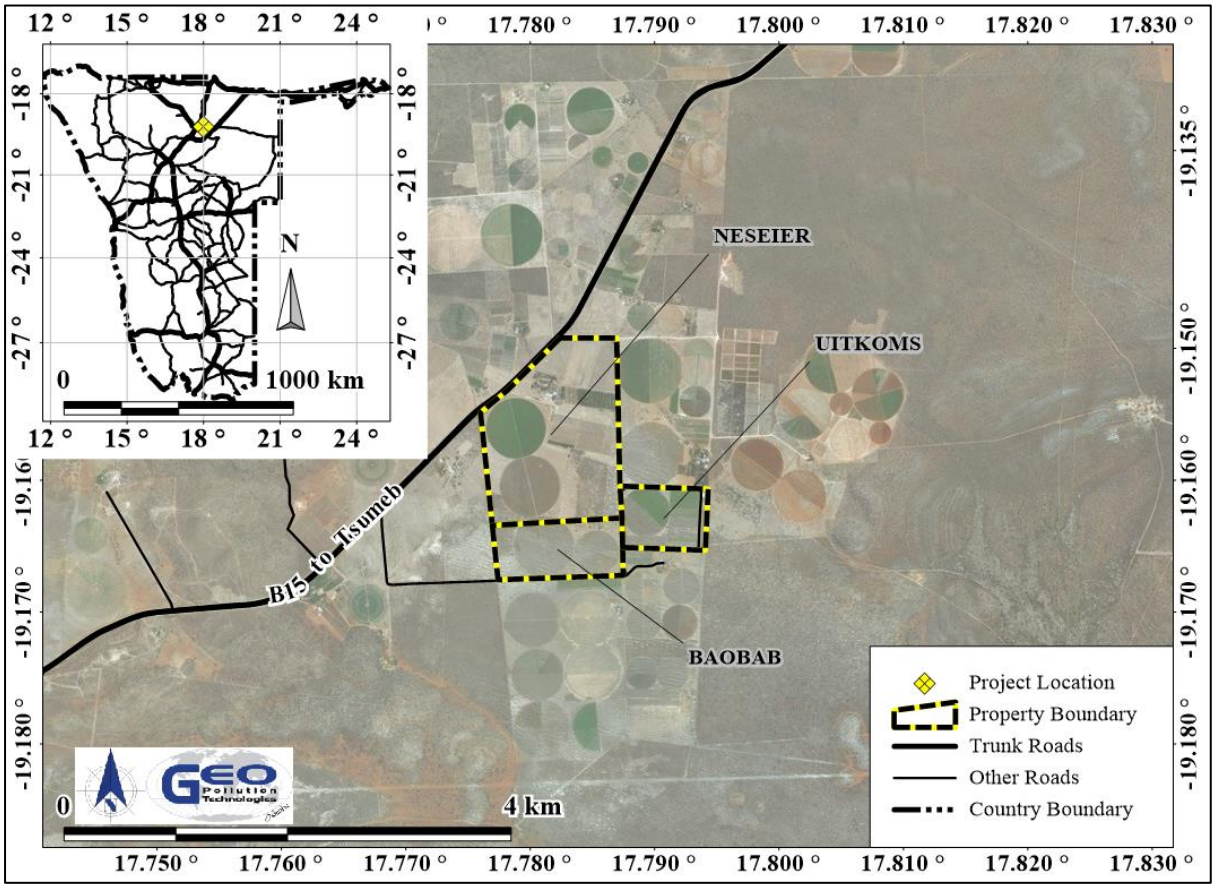


Figure 1-1 Project location

Project Justification – The agricultural sector is one of the most important employment sectors in Namibia. Currently agriculture supports approximately 70% of Namibians and provide employment to roughly a third of the workforce. In general, Namibia's vision is to see a reduction in food insecurity and an increase in food production. The Proponent has a well-established agriculture development on his farming unit that contributes to food security and employment in Namibia. In addition high value crops produced for international markets. Furthermore, the Proponent continuously investigate and implement improved farming methods to enhance productivity.

Benefits of the agricultural activities conducted by the Proponent include:

- Food production and enhanced food security.
- Employment and supporting of livelihoods of both unskilled, semi-skilled and skilled labourers.
- Technological development and investment in agricultural practices.
- Generation of income that contributes to the national treasury and a positive trade balance through the export of produce to international markets.
- Support for economic resilience in the area through diversified business activities and opportunities.

2 SCOPE

The aims and objectives of this report are to:

- Determine the potential environmental impacts emanating from the agricultural and related activities on, as well as possible decommissioning of, the farm.
- Identify a range of management actions to mitigate the potential adverse impacts to acceptable levels.
- Comply with the requirements of EMA.
- Provide sufficient information to the relevant competent authority and the Ministry of Environment, Forestry and Tourism (MEFT) to make an informed decision regarding the project and the issuing of an environmental clearance certificate.

3 METHODOLOGY

Methods employed to investigate potential impacts on the social and natural environment due to the agricultural and related activities on, as well as possible decommissioning of, the farm include:

- Detailed infrastructure and operational procedures were obtained from the client and described in the report.
- Baseline information about the site and its surroundings were obtained from primary information, existing secondary information as well as from a reconnaissance site visit.
- As part of the scoping process to determine potential environmental impacts, interested and affected parties (IAPs) were consulted about their views, comments and opinions, all of which are presented in this report.
- Impacts were identified and preventative and mitigation measures suggested in the EMP.

4 OPERATIONS AND RELATED ACTIVITIES

Agricultural activities have been the main activity on Neseier, Uitkoms and Baobab for many years. The following sections provide brief descriptions of the infrastructure, operations and services supply on the farms which function as one faming unit.

4.1 LAND CLEARING

Almost the entire farming unit was historically (more than 10 years) cleared and is currently used for crop production. No additional areas are planned to be cleared in near future.

4.2 CROP PRODUCTION

One hundred and forty-four hectares of land has historically been cleared for irrigation. Irrigation is by means of centre pivot, micro-sprayer and sprinkler irrigation systems. Carrots, maize, sorghum, radishes, and onions are the main annual crops that are planted on a rotational basis.

Various other crops are also considered periodically depending on market demand. A small 10 ha citrus orchard is also present.

Photo 4-1 Cleared field

Photo 4-2 Citrus orchard

Photo 4-3 Field with centre pivot

Photo 4-4 View of the farm from the main entrance

Preparation of the land and planting entails mechanical activities like ripping, tilling and seeding of the soil with tractors and specialised implements. Fertilizers and pesticides are applied to crops as required and according to the specifications for application. Fertilizers are typically applied by mixing into the water tanks and then applying via the irrigation systems. Harvesting is either mechanical or manual processes or a combination of the two. Pesticides are administered as per the specified application procedures for the corresponding pest by means of tractor spraying. To ensure correct and safe application of pesticides, a pesticide plan is implemented and regularly updated. All pesticides are stored in a dedicated chemical store and employees are provided with training to ensure the safe handling of fertilisers and pesticides.

Photo 4-5 Mobile fertiliser mixing tank

Photo 4-6 **Pesticide storage room**

Photo 4-7 Fertiliser mixing tank

Photo 4-8 Pesticide training certificate

4.3 PACKAGING AND STORAGE

A dedicated packaging store is present on site where produce is packaged according to customer specifications. Packaging is a mixed mechanical and manual process. Packaged goods are stored on pallets before being loaded into trucks for transport to customers.

4.4 WATER SUPPLY

The project area falls under sub-division B2 of the water control area (Tsumeb-Otavi-Grootfontein Subterranean Water Control Area.). The only available water supply for the project area is groundwater. Irrigation is from five production boreholes, by means of mainly centre pivot irrigation, sprinkler and micro sprayer systems. Submersible pumps are installed in the boreholes to pump water via pipelines to irrigation systems on the respective fields. On demand, the water is mixed with fertilizers in mobile or fixed fertilizer mixing tanks, and then transferred to the irrigation systems. The irrigation boreholes are fitted with flow meters. All five boreholes are registered with the Department of Water Affairs (DWA) and have related WW numbers. Borehole WW35785 is registered for Baobab which currently has an abstraction permit for 130,000 m^3/a which is valid until 2025. Boreholes WW35787 and WW35718 are registered for Uitkoms which currently has an abstraction permit for 150,000 m^3/a that was valid until February 2023 and is currently being renewed. Boreholes WW32515 and WW32516 are linked to the

Neseier operations which had an abstraction permit for 260,000 m^3/a that expired in 2022 and the renewal process is in progress. During this renewal process, the environmental assessment and hydrogeological specialist input was identified to be key to the renewal of the water permits. More boreholes are present on the farm, but are used for domestic and stock watering purposes and are not associated with abstraction for irrigation purposes. All boreholes are presented in Figure 4-1 and a summary of the boreholes' details presented in Table 4-1.

Reference can be made to the hydrogeological specialist assessment in Appendix B. From this assessment it is evident that water levels are not decreasing (in fact it rather shows increasing levels) as a result of irrigation.

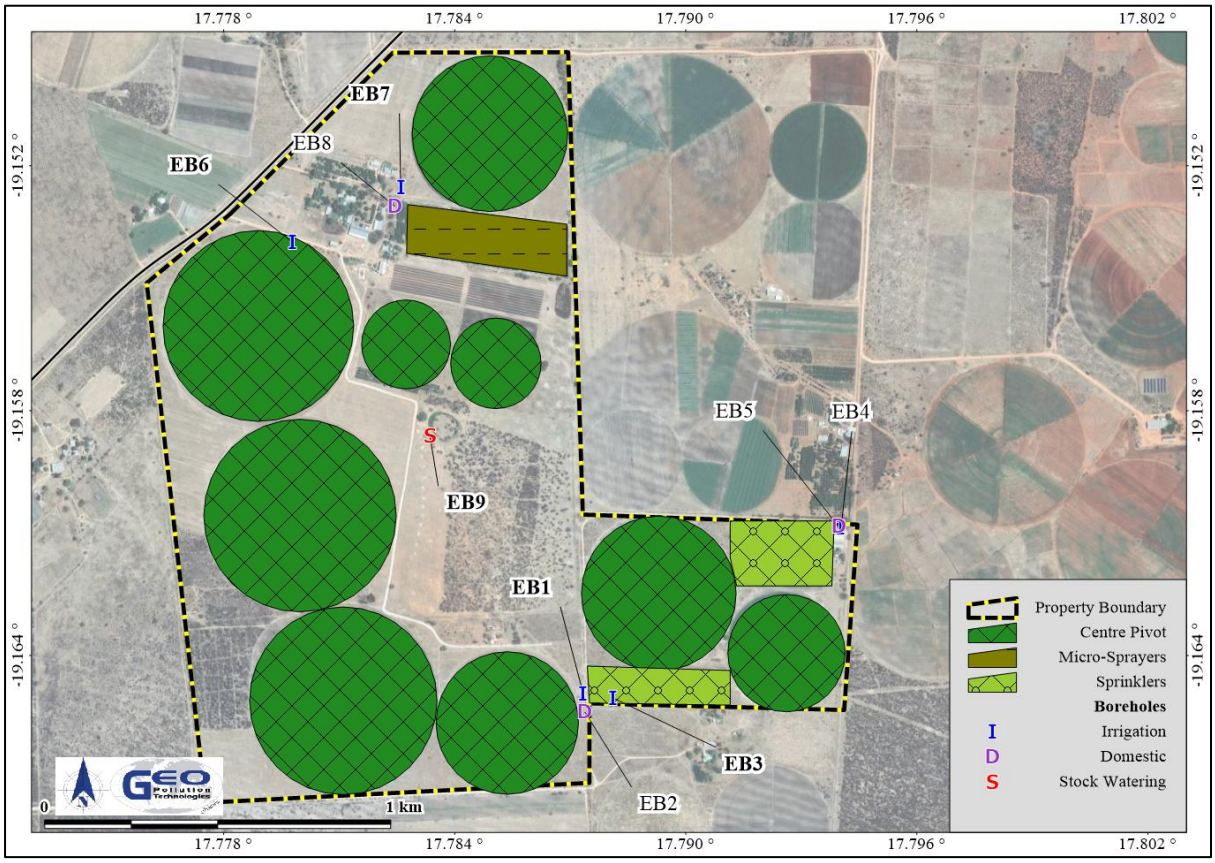


Figure 4-1 Farm layout – irrigation areas in relation to boreholes

Table 4-1 Summary of borehole information

Map Ref.	Farm Name	WW Number	Use
EB1	Baobab	WW35785	Irrigation
EB2	Baobab	None	Domestic
EB3	Uitkoms	WW35787	Irrigation
EB4	Uitkoms	WW35718	Irrigation
EB5	Uitkoms	None	Domestic
EB6	Neseier	WW32516	Irrigation
EB7	Neseier	WW32515	Irrigation
EB8	Neseier	None	Domestic
EB9	Neseier	None	Stock watering

Photo 4-9 **Borehole with installed pump and fertiliser reservoir mixing unit**

Photo 4-10 **Flow meter at irrigation boreholes**

Photo 4-11 **Borehole with installed pump**

Photo 4-12 **Flow meter at boreholes**

4.5 SUPPORT INFRASTRUCTURE AND SERVICES

A dedicated, locked chemical room stores pesticides, lubricants, seeds, etc. Shelves in the chemical room have spill control in the form of drip trays to collect any accidental spills. The store room has the appropriate warning signs, personal protective equipment (PPE) requirements, as well as an emergency eye wash station.

A consumer fuel installation with two 2.2 m^3 aboveground diesel tanks is present at Neseier. The Proponent is considering replacing the two tanks with one 14 m^3 tank. A consumer fuel installation with one 2.2 m^3 diesel tank is present at Baobab. The tanks are situated within bund areas to prevent environmental contamination in case of tank failure or overfilling. Should the 14 m^3 tank be installed, a new suitably sized bunded area will be constructed with the capacity to hold 110% of the volume of the tank.

All water for domestic uses is obtained from dedicated boreholes on the farm. Electricity supply is from Cenored, but is augmented by the Proponent's own photovoltaic installations. General waste is taken to the municipal waste disposal facility of Tsumeb. However, all containers that contained chemicals or pesticides are handed in to the Ministry of Agriculture and Land Reform's facility in Tsumeb, who in turn issues a receipt as proof of the safe disposal thereof (Appendix A). Firefighting equipment is present on the farm and first aid kits are available for minor injuries or ailments.

Packing warehouses have been erected on farms Neseier and Uitkoms.

Photo 4-13 Consumer fuel installation

Photo 4-14 Warning signs at fuel storage

Photo 4-15 Photovoltaic solar pannel

Photo 4-16 Chemical storage area

Photo 4-17 Fire extinguisher

Photo 4-18 Services dates on fire extinguisher

4.6 EMPLOYMENT

The Proponent employs 20 permanent employees and up to 150 seasonal workers. The permanent workers are provided with housing on the farm. Worker housing is supplied with running water as supplied from boreholes and electricity from Cenored. Ablution facilities at the workers' housing have showers and flush toilets connected to french drain systems. Seasonal employees are transported from Tsumeb to the farm and back on a daily basis when required. All workers on the farm are Namibian citizens. Selected personnel are trained in firefighting and first aid.

Workers are also trained in safe handling of plant protective products (pesticides). An emergency response plan is in place that outlines the procedures to be followed during accidents, accidental exposure to chemicals, etc.

4.7 GENERAL

Incorporated into the farming operations is a small game camp with a few antelope which is located on the farm Neseier. The game camp is suitably fenced with water provided to animals via a boreholes and solar pump installation. This portion of the property is largely left in a natural and undisturbed state.

The farming unit is GLOBALG.A.P. certified (Appendix A). GLOBALG.A.P. is an internationally recognized assurance program for good agricultural practices. Being GLOBALG.A.P. certified requires farmers to: 1) use production techniques that reduce the impact of farming on the environment; 2) reduce the use of chemicals; 3) make efficient use of natural resources; and 4) safeguard the welfare of both workers and farm animals. To meet these goals, selected personnel are, among others, also trained in safe and responsible pesticide handling, mixing and application techniques (Appendix A). In addition, an emergency response plan, a hygiene policy, and safety and hygiene rules, are clearly stipulated and available to all employees.

To achieve and sustain GLOBALG.A.P. certification, the farm is regularly audited by independent auditors to ensure adherence to all GLOBALG.A.P. requirements.

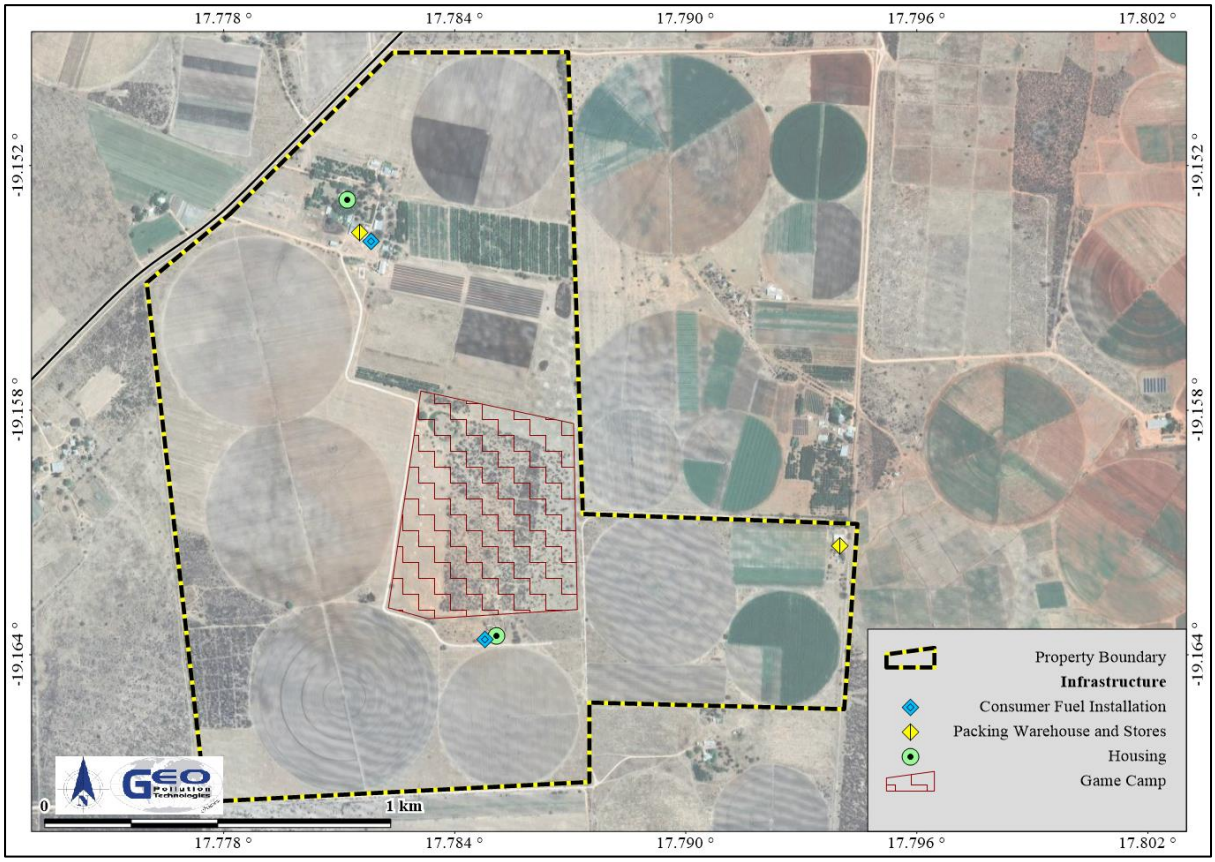


Figure 4-2 Farm layout - infrastructure

Photo 4-19 Packaging store

Photo 4-20 Stored hay bales

Photo 4-21 Mobile mixing tank

Photo 4-22 Warnings and PPE requirements

5 ALTERNATIVES

Various alternatives related to the project are considered and each of these discussed. The alternatives can roughly be grouped into three main categories, namely:

- Location alternatives;
- Project implementation and design alternatives;
- No-go alternative.

5.1 LOCATION ALTERNATIVES

The proposed location for irrigation is well suited for crop production due to the availability of water and suitability of soils. Boreholes are already in place and land clearing and field establishment have already been completed. Irrigation based crop production has been conducted in the farming unit for more than 10 years. No location alternatives are therefore considered feasible, as the Proponent owns and or manages the properties, on which operations are conducted.

5.2 PROJECT IMPLEMENTATION AND DESIGN ALTERNATIVES

Various alternatives are continually considered to optimise crop production an irrigation. Boreholes are already in place and no surface water is available. Therefore, there are no alternative water sources for the existing and proposed irrigation operations. However, there are a number of alternatives with regards to the application of the water used. The most pertinent relates to crop irrigation methods.

5.2.1 Irrigation Methods

When considering alternative irrigations systems, the most viable irrigation option is not only based on the irrigation system's design efficiency, but should include environmental constrains and operating costs. Some systems are simply not viable due to climatic and topographical features as well as cost implications. For example, flood irrigation is not viable on steeper gradients and are more expensive due to water pumping costs and less efficient in water conservation.

The type of produce cultivated also plays a determining role. It will not be feasible to install highly efficient yet expensive irrigation systems (such as drip irrigation) for crops with lower economic yields. In turn, some crops will not produce such high yields when cultivated under less efficient systems. Table 5-1 depicts different types of irrigation systems as per the South African Irrigation Institute's suggested efficiencies (IWRM Plan Joint Venture Namibia, 2010). Although flood systems are not viable irrigation methods, these have been included for comparison with regards to capital cost and design efficiency.

Table 5-1 Irrigation system efficiency (IWRM Plan Joint Venture Namibia, 2010)

Irrigation System	Design Efficiency
Flood: Furrow	65%
Flood: Border	60%
Flood: Basin	75%
Sprinkler: Dragline	75%
Sprinkler: Quick-coupling	75%
Sprinkler: Permanent	85%
Sprinkler: Travelling boom	80%
Sprinkler: Centre pivot	85%
Sprinkler: Linear	85%
Sprinkler: Micro sprinkler	85%
Micro: Spray	90%
Micro: Drip	95%

In the Tsumeb area, climatic and soil conditions necessitate an irrigation system with a high rate of water deposition (due to evaporation and soil salinization). For purposes of irrigation, centre pivot and sprinkler systems are suitable.

5.2.2 Soil Preparation

Traditionally, soil is prepared for planting by tilling and ploughing. These processes break the top layer of soil at varying depths and mix residual plant material into the soil. It also uproots weeds and provide for loose soil. There is nowadays however a shift in the approach to soil preparation that has some advantageous over traditional tilling. Conservation tillage practises aims at less disturbance of the soil and has advantages of less erosion, less evaporation and saves on time and costs of traditional tilling. Conservation tillage can either be just partial tillage as is the case with strip-tilling or no tilling at all. With strip-tillage, only narrow strips are tilled in the area where planting will take place. The areas, between planted rows, are left untilled and with residual plant material from the previous harvest. With no-tillage, seeds are planted on the field with no soil preparation at all. The Proponent should investigate the applicability and potential advantages of conservation tillage.

Table 5-2 Advantages and disadvantages of land preparation systems (adapted from https://cropwatch.unl.edu/tillage/advdisadv)

System	Major advantages	Major disadvantages
Plow	Suited for poorly drained soils. Excellent incorporation (mixing of soil for easy combination with chemical and organic elements). Well-tilled seedbed.	Major soil erosion. High soil moisture loss. Timeliness considerations. Highest fuel and labour costs. Reducing soil organic matter (micro flora and fauna), reduced soil structural stability. Increased surface runoff and water or wind erosion.
Disk	Less erosion with more residue. Well adapted for well-drained soils. Good incorporation.	Little erosion control with more operations. High soil moisture loss. Destroys soil structure. Compacts wet soil.
Strip-till	Tilled residue-free strip warms quickly. Injection of nutrients into row area. Well suited for poorly drained soils. Less wear on machinery, less use of fuel or animal power, less time devoted to soil preparation by the farmer thus a possible overall improvement in gross returns for the farm. Heavy rain, is more likely to concentrate in the seeder slots and thereby penetrate directly to the crop's root zone. Improve general water use efficiency by the crop.	Cost of pre-plant operation. Strips may dry too much, crust, or erode without residue. Not suited for drilled crops (mechanised seeding). Timeliness in wet falls. It also disturbs the soil but limits that disturbance to rows or slots in which the crop seeds and fertilizer are placed.
No-till	Excellent erosion control. Soil moisture conservation. Minimum fuel and labour costs. Builds soil structure and health.	No incorporation. Increased dependence on herbicides. Slow soil warming on poorly drained soils. Problems of disease and residue handling. Herbicides have long-term impacts on the environment. Some weeds have developed resistance to some herbicides, leading to a need to rotate both crops and herbicide groups in order to keep crops weed-free, or to plant GMO crop.

5.3 NO GO ALTERNATIVE

Agriculture has been a core activity of the faming unit and in the region for decades. Should the project not receive an environmental clearance certificate, there would be a loss in capital investment and employment. This will lead to a decrease in the spending power of the local community. Finally, less revenue will be generated for Namibia and more money will be required for importing of feed and food.

6 ADMINISTRATIVE, LEGAL AND POLICY REQUIREMENTS

To protect the environment and achieve sustainable development, all projects, plans and programmes deemed to have adverse impacts on the environment require an ECC. Namibian legislation lists specific activities which are required to apply for an ECC. The current and proposed agricultural operations fall within the ambit of these activities, as per Section 3 of Government Gazette No 4878. Listed activities which require an ECC application (Government Regulation No 29 of 2012) related to this project include the following:

Section 4: Forestry Activities

- 4 The clearance of forest areas, deforestation, afforestation, timber harvesting or any other related activity that requires authorisation in terms of the Forest Act, 2001 (Act No 12 of 2001) or any other law. Various portions of the farm have previously been cleared.

Section 7: Agriculture and Aquaculture Activities

- 7.5 Pest control: The Proponent use conventional pest control products as approved by the Namibian government for some of the produce. These may include herbicides and pesticides and will vary according to season and pests encountered during a year.

Section 8 of Government Notice No. 29 of 2012: Water Resource Developments

- 8.1. The abstraction of ground or surface water for industrial or commercial purposes: Groundwater is abstracted for current and proposed commercial operations.
- 8.7 Irrigation schemes for agriculture excluding domestic irrigation: No *irrigation scheme* was developed, however, *irrigation systems* are used on the farm. Irrigation on the farm does not contribute to, or is part of any irrigation scheme, as proclaimed by the Namibian Government.

Section 9 of Government Notice No. 29 of 2012: Hazardous Substance Treatment, Handling and Storage

- 9.1 The manufacturing, storage, handling or processing of a hazardous substance defined in the Hazardous Substances Ordinance, 1974. The farm has a fuel installation for *storing* diesel in aboveground tanks with a combined capacity of 6.6 m^3.
- 9.2 Any process or activity which requires a permit, licence or other form of authorisation, or the modification of or changes to existing facilities for any process or activity which requires an amendment of an existing permit, licence or authorisation or which requires a new permit, licence or authorisation in terms of a law governing the generation or release of emissions, pollution, effluent or waste: The farm has a fuel installation for *storing* diesel in aboveground tanks with a combined capacity of 6.6 m^3 which requires a consumer fuel installation certificate as per the Ministry of Mines and Energy.

The legislation and standards provided in Table 6-1 to Table 6-3 govern the environmental assessment process in Namibia, and are relevant to the assessed development.

Table 6-1 Namibian law applicable to the development

Law	Key Aspects
The Namibian Constitution	♦ Promote the welfare of people ♦ Incorporates a high level of environmental protection ♦ Incorporates international agreements as part of Namibian law
Environmental Management Act Act No. 7 of 2007, Government Notice No. 232 of 2007	♦ Defines the environment ♦ Promotes sustainable management of the environment and the use of natural resources ♦ Provides a process of assessment and control of activities with possible significant effects on the environment
Environmental Management Act Regulations Government Notice No. 28-30 of 2012	♦ Commencement of the Environmental Management Act ♦ List activities that requires an environmental clearance certificate ♦ Provide Environmental Impact Assessment Regulations
Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act Act No. 36 of 1947; Government Notice No. 1239 of 1947	♦ Governs the registration, importation, sale and use of fertilizers, farm feeds, agricultural remedies and stock remedies ♦ Various amendments and regulations
Seed and Seed Varieties Act 23 of 2018 Act No. 23 of 2018, Government Notice No. 368 of 2018	♦ Provides for restrictions on the importation of seed ♦ Not in force yet

Law	Key Aspects
The Water Act Act No. 54 of 1956	♦ Remains in force until the new Water Resources Management Act comes into force ♦ Defines the interests of the state in protecting water resources ♦ Controls water abstraction and the disposal of effluent ♦ Numerous amendments
Water Resources Management Act Act No. 11 of 2013	♦ Provides for management, protection, development, use and conservation of water resources ♦ Prevention of water pollution and assignment of liability ♦ Not in force yet
Forest Act (Act 12 of 2001, Government Notice No. 248 of 2001)	♦ Makes provision for the protection of the environment and the control and management of forest fires ♦ Provides for the licencing and permit conditions for the removal of woody and other vegetation as well as the disturbance and removal of soil from forested areas
Forest Regulations: Forest Act, 2001 Government Notice No. 170 of 2015	♦ Declares protected trees or plants ♦ Issuing of permits to remove protected tree and plant species
Soil Conservation Act Act No. 76 of 1969	♦ Law relating to the combating and prevention of soil erosion, the conservation, improvement and manner of use of the soil and vegetation and the protection of the water sources in Namibia
Biosafety Act	♦ Regulate activities involving the research, development, production, marketing, transport, application and other uses of genetically, modified organisms and specified products derived from genetically modified organisms ♦ Prohibits planting of genetically modified organisms without registration
Petroleum Products and Energy Act Act No. 13 of 1990, Government Notice No. 45 of 1990	♦ Regulates petroleum industry ♦ Makes provision for impact assessment ♦ Petroleum Products Regulations (Government Notice No. 155 of 2000) ♦ Prescribes South African National Standards (SANS) or equivalents for construction, operation and decommissioning of petroleum facilities (refer to Government Notice No. 21 of 2002)
Local Authorities Act Act No. 23 of 1992, Government Notice No. 116 of 1992	♦ Defines the powers, duties and functions of local authority councils
Public and Environmental Health Act Act No. 1 of 2015, Government Notice No. 86 of 2015	♦ Provides a framework for a structured more uniform public and environmental health system, and for incidental matters ♦ Deals with Integrated Waste Management including waste collection disposal and recycling, waste generation and storage, and sanitation

Law	Key Aspects
Labour Act Act No 11 of 2007, Government Notice No. 236 of 2007	♦ Provides for Labour Law and the protection and safety of employees ♦ Labour Act, 1992: Regulations relating to the health and safety of employees at work (Government Notice No. 156 of 1997)
National Heritage Act No. 27 of 2004, Government Notice No. 287 of 2004	♦ Provides for the protection of heritage, archaeological and palaeontological resources
Atmospheric Pollution Prevention Ordinance Ordinance No. 11 of 1976	♦ Governs the control of noxious or offensive gases ♦ Prohibits scheduled process without a registration certificate in a controlled area ♦ Requires best practical means for preventing or reducing the escape into the atmosphere of noxious or offensive gases produced by the scheduled process
Hazardous Substances Ordinance Ordinance No. 14 of 1974	♦ Applies to the manufacture, sale, use, disposal and dumping of hazardous substances as well as their import and export ♦ Aims to prevent hazardous substances from causing injury, ill-health or the death of human beings
Pollution Control and Waste Management Bill (draft document)	♦ Not in force yet ♦ Provides for prevention and control of pollution and waste ♦ Provides for procedures to be followed for licence applications

Table 6-2 Relevant multilateral environmental agreements

Agreement	Key Aspects
Stockholm Declaration on the Human Environment, Stockholm 1972	♦ Recognizes 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
United Nations Framework Convention on Climate Change (UNFCCC)	♦ The Convention recognises that developing countries should be accorded appropriate assistance to enable them to fulfil the terms of the Convention
Convention on Biological Diversity, Rio de Janeiro, 1992	♦ Under article 14 of The Convention, EIAs must be conducted for projects that may negatively affect biological diversity
International Treaty on Plant Genetic Resources for Food and Agriculture, 2001	♦ Promote conservation, exploration, collection, characterization, evaluation and documentation of plant genetic resources for food and agriculture ♦ Promote the sustainable use of plant genetic resources for food and agriculture

Table 6-3 Standards or codes of practise

Standard or Code	Key Aspects
GLOBALG.A.P.	♦ Farm assurance program, translating consumer requirements into good agricultural practice
South African National Standards (SANS)	♦ The Petroleum Products and Energy Act prescribes SANS standards for the construction, operations and demolition of petroleum facilities

	♦ SANS 10089-3:2010 is specifically aimed at storage and distribution of petroleum products at fuel retail facilities and consumer installations ♦ SANS 10131 (2004) is aimed at above-ground storage tanks for petroleum products ♦ Provide requirements for spill control infrastructure

Additional national planning legislation considered include:
The environmental assessment considered the goals set out as per Namibia's Vision 2030 and the various related National Development Plans (NDP's) as well as the "Growth at Home Strategy. In particular, an aspect highlighted as being paramount to the project, is groundwater used for commercial purposes. Therefore, during the environmental impact assessment, the goals of Vision 2030, which have specifically been adopted for the water sector, were kept in mind. These goals are summarised as follows:

Vision 2030 -Freshwater and Associated Resources:
- Water allocated and used efficiently
- Irrigation of only high value and strategic crops on suitable soils,
- Clean, unpolluted water,
- Productive and healthy natural wetlands with rich biodiversity, and
- Optimal and strategic economic development options.

The development targets stated in the NDP3 (and which is being built on during the NDP4 & 5), in the Key Result Area: Productive utilization of natural resources and environmental sustainability, Sub sector 4 (water), include:
- Increasing the contribution of water to gross domestic product (GDP),
- Increasing the average value added per cubic meter (m^3) of water used,
- Increasing the irrigation water supply, and
- Increasing availability of water, national water supply and potable water supply for people and livestock.

In addition to the development goals, Namibia's Growth at Home strategy reinforces the importance of accelerating economic growth, reducing income inequality and increasing employment. According to the Minister of Finance, the strategy seeks to accomplish the cabinet-approved Industrial Policy, which was ratified by parliament in 2012.

7 ENVIRONMENTAL CHARACTERISTICS

This section lists pertinent environmental characteristics of the study area and provides a statement on the potential environmental impacts on each.

7.1 LOCALITY AND SURROUNDING LAND USE

Neseier, Baobab and Uitkoms (centred around 19.15350 °S; 17.78130 °E) are located approximately 15 km northeast of Tsumeb, along the B15 trunk road (road number T1501) leading to Tsintsabis. All adjacent properties are farms and land use thus consists of agriculture. Crop cultivation has been documented in the area since prior to 1975 during which time the first maps of the cultivated areas on the site were mapped. The adjacent farms are listed in Table 7-1 and indicated in Figure 7-1. An exclusive prospecting license for base and rare and precious metals for Epangelo Mining Company (Pty) Ltd is registered over the most of the farming unit. The Tsumeb Smelter is located approximately 8 km southwest of the farming unit.

Implications and Impacts

The location is well suited for the agricultural activities due to the characteristics of the surrounding environment, current land use and climate. The farm is surrounded by properties with activities of similar nature. Neseier, Uitkoms and Boabab follows sustainable agricultural

practices in line with GlobalG.A.P. requirements, thus also ensuring impacts on the surrounding land-users are minimised

Table 7-1 Adjacent farms

ID on Map	Farm Number	Direction from Proponent
Neseier	Ptn 8 of Farm Ludwigshafen No. 480	Proponent's Farm
Baobab	Ptn 24 of Farm Ludwigshafen No. 480	Proponent's Farm
Uitkoms	Ptn 11 of Farm Ludwigshafen No. 480	Proponent's Farm
A	Ptn 5 of Farm Ludwigshafen No. 480	Northwest
B	Ptn 6 of Farm Ludwigshafen No. 480	West
C	Ptn 7 of Farm Ludwigshafen No. 480	West to Southwest
D	Ptn 20 of Farm Ludwigshafen No. 480	South
E	Ptn 21 of Farm Ludwigshafen No. 480	South
F	FMB/01249	East
G	Ptn 9 of Farm Ludwigshafen No. 480	East and North
H	Ptn 10 of Farm Ludwigshafen No. 480	Northeast
I	Ptn 18 of Farm Ludwigshafen No. 480	North
J	Ptn 14 of Farm Ludwigshafen No. 480	North
K	Ptn 19 of Farm Ludwigshafen No. 480	North

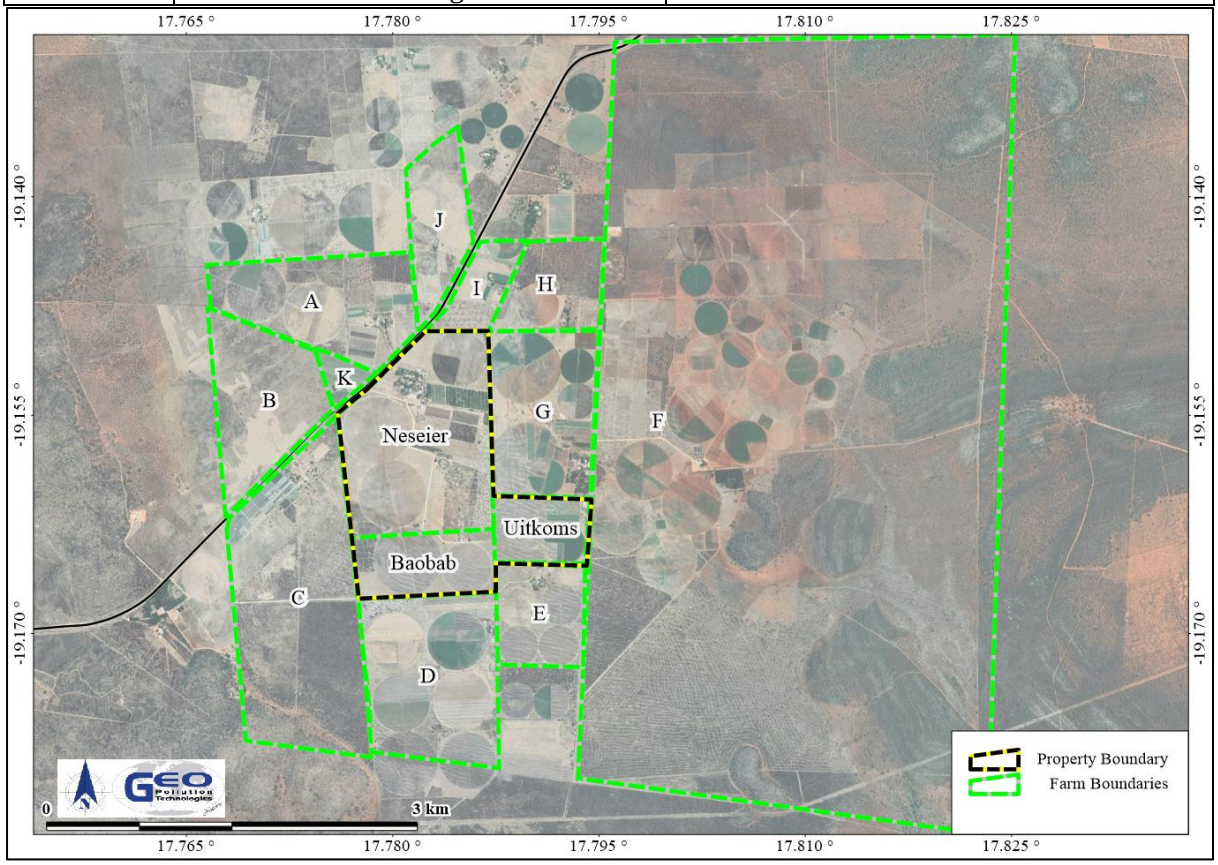


Figure 7-1 Properties adjacent to the project area

7.2 CLIMATE

The general lack of functioning weather stations in Namibia, in especially rural areas, limits the availability of long term, true weather data. As a best possible workaround, long term climate data was obtained from the Atlas of Namibia Project (2002) and the CHIRPS-2 database (Funk et al., 2015), see Table 7-2 and Figure 7-2.

The CHIRPS-2 dataset (Climate Hazards Group Infra-Red Precipitation with Station data version 2) consist of long term rainfall data (1981 to near-present) obtained from satellite imagery and in situ station data. It is calculated as an average over a 5 km by 5 km area and as such measurements may be lower than actual very localised, heavy rainfall events. However, the resultant dataset provides a reasonably well represented overview of the rainfall conditions of a general area.

According to the Köppen-Geiger Climate Classification system the project is located in a hot semi-arid climate (BSh). Average rainfall received is 450-500 mm/a with a variation of < 30 %. Monthly rainfall peaks in January. The potential evapotranspiration is 2,400 – 2,500 mm/a. By dividing the mean annual potential evapotranspiration into the mean annual precipitation, an aridity index value for the area was computed as 0.2, which indicates the area to be semi-arid. This means that the area receives precipitation below potential evapotranspiration, but not as low as a desert climate and has a mean annual temperature of at least 18 °C. The average annual minimum temperature is 6-8 °C, while the average annual maximum temperature is 32-34 °C, with an average annual temperature range of 26-28 °C. An average diurnal temperature (difference between daily minimum and maximum temperature) for this area is around 16-18 °C. Direct normal solar irradiance for the area is 6.674 kWh/m^2/day (Atlas of Namibia Team, 2022). Prevailing winds as measured at the Tsumeb Airfield is predominantly east winds (Figure 7-3).

The rain season normally starts in October and last until April, peaking in January and February. Heavier rainfall (single day events) occur between November and April, with a single event of 50.3 mm in January (last 40 years data) being the highest (Table 7-2). Most of the single day maximums are less than 50 mm. This value is probably less than in reality as the area receives heavy rainfall from thunderstorm cells, which are normally smaller than the 5 X 5 km grid sizes of the CHIRPS data.

The average annual evaporation rate remains high at up to 3,000 mm/a. The average annual precipitation for the last 40 years was calculated as 442 mm/a, with a coefficient of variance of 25% (Table 7-2). Daily and seasonal precipitation data (Funk et al., 2015) is presented in Figure 7-2. Seasonal (July to June) total precipitation, centred on the average line for the last 40 years, is presented, with the daily total precipitation and the seasonal cumulative precipitation. From the figure it is clear that six out of the last ten seasons were much drier than usual.

Implications and Impacts

Water is a scarce and valuable resource in Namibia. Rainfall events are often thunderstorms with heavy rainfall that can occur in short periods of time ("cloud bursts"). Rainfall in the area is above the Namibian average, but water remains a vulnerable resource. Heavy rainfall can lead to soil erosion when improper agricultural practises are employed. Recurring drought conditions may impact on groundwater availability due to reduced aquifer recharge. However, rainfall events also ensure reduced groundwater abstraction for irrigation as irrigation is significantly augmented during such rainfall events. The farming units falls within a higher rainfall area which requires less irrigation when compared to other climatic zones in Namibia.

Very high summer temperatures may result in heatstroke in workers and also influence produce development. The high amount of sunlight hours, coupled with the low occurrence of frost, are favourable conditions for crop cultivation as well as the use of photovoltaic solar systems employed on the farming unit.

Climate change contributors are largely related to the mechanised systems used as part of operations. Effects of climate change to consider during the proposed operations over the next 30 years include a 10% increase in water use for irrigation due to evaporative losses.

Dominant wind directions in the project area are east and north-east winds. Any dust or air pollutants originating at the site will be carried to downwind receptors. Due to the prevailing wind conditions, it is also unlikely that pollution from the smelter at Tsumeb will be carried towards the site.

Table 7-2 Rainfall statistics (Funk et al, 2022)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum (mm/m)	10.46	31.22	20.88	6.42	0.00	0.00	0.00	0.00	0.00	5.38	8.75	20.50
Maximum (mm/m)	248.52	167.54	137.39	102.36	2.10	0.72	0.04	0.02	3.69	55.58	99.29	157.08
Average (mm/m)	98.0	96.8	70.8	26.7	0.1	0.0	0.0	0.0	0.3	18.8	42.4	77.3
Variability (%)	59.0	44.0	43.0	82.0	377.0	367.0	452.0	624.0	256.0	71.0	49.0	47.0
Daily maximum (mm)	50.3	37.2	50.0	38.5	2.1	0.5	0.0	0.0	2.9	25.7	28.9	43.6
Average rain days	14	12	8	3	0	0	0	0	0	3	7	11
Season July - June average: 442 mm					Season coefficient of variation: 25 %							
Data range	1981-Jul-01		to	2022-Jun-30						Lat: 19.1535°S Long: 17.7813°E		

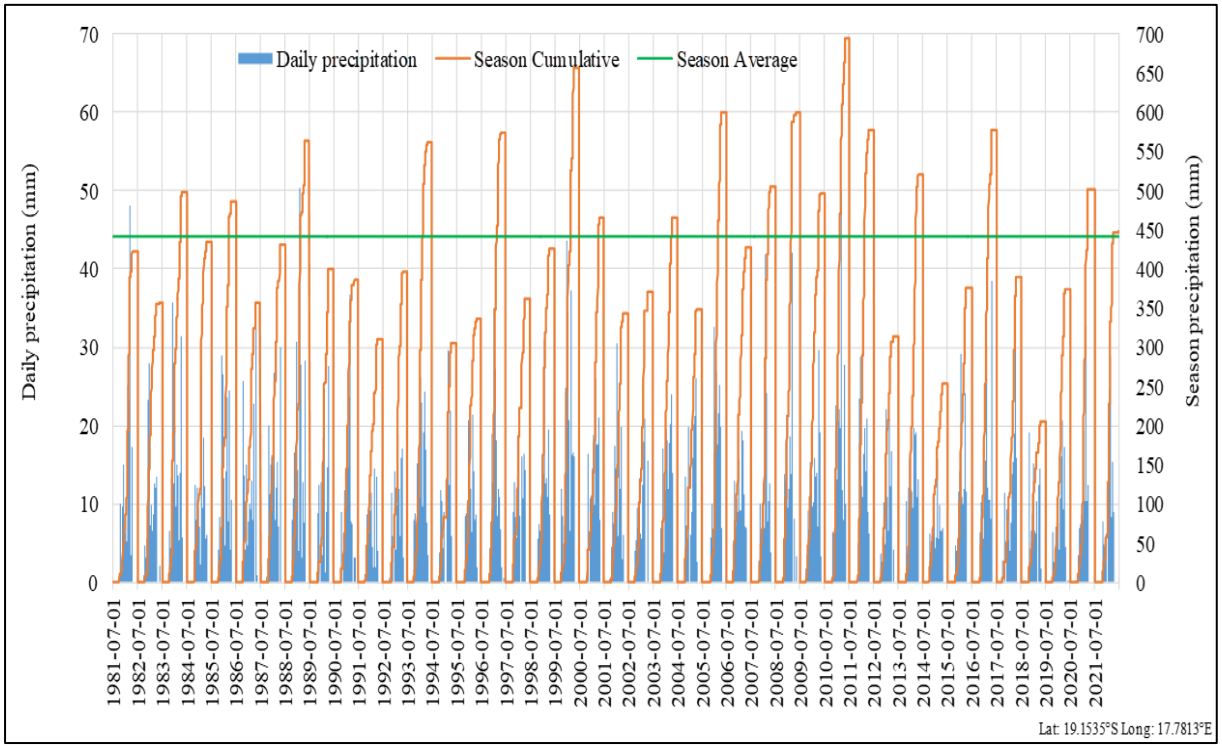


Figure 7-2 Daily and seasonal precipitation (Funk et al., 2015)

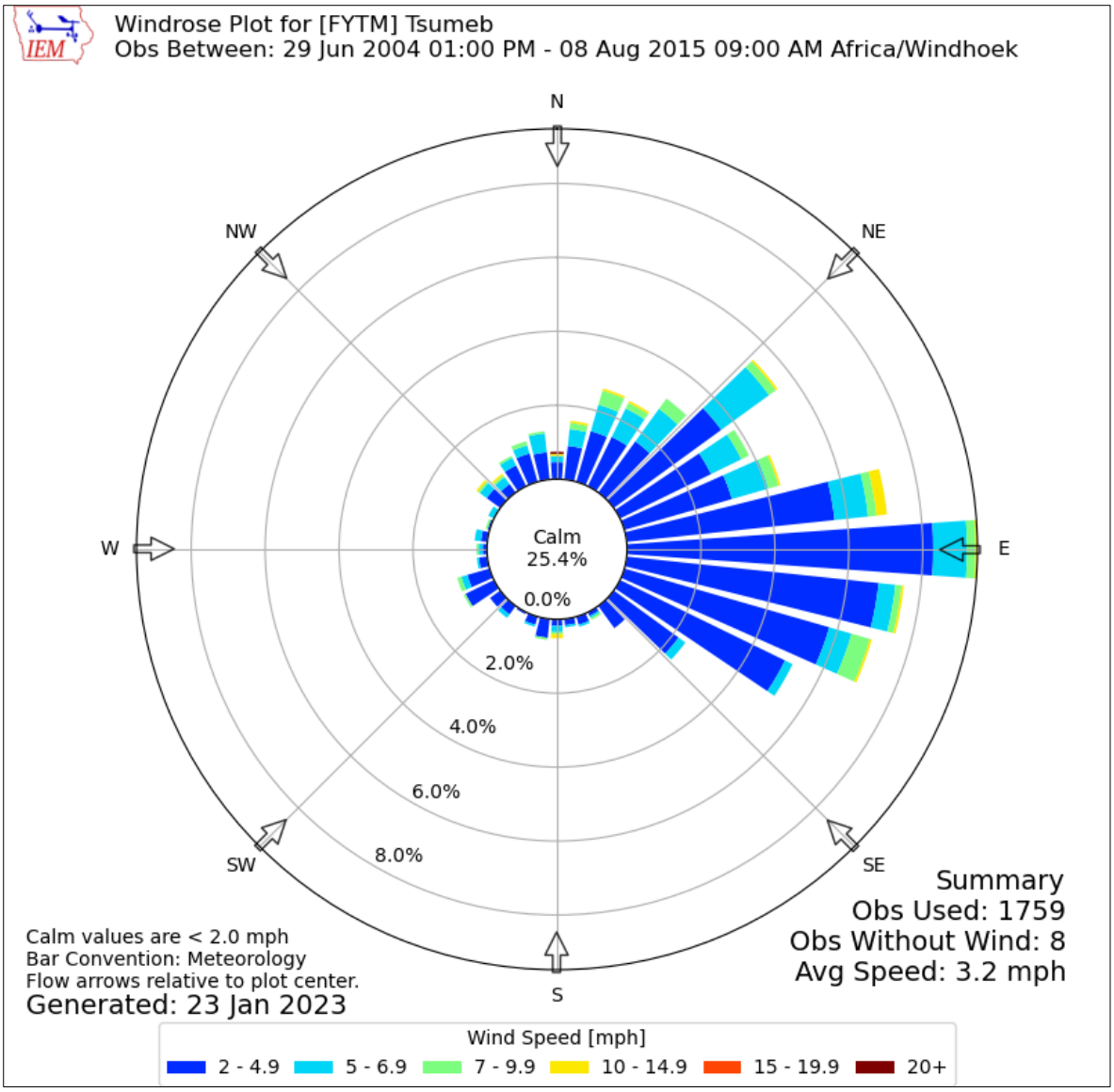


Figure 7-3 Windrose for Tsumeb Airport (https://mesonet.agron.iastate.edu)

7.3 TOPOGRAPHY AND DRAINAGE

The farming unit is located on the northern edge of the Karstveld Landscape where the landscape changes into the Kalahari sandveld with palaeo dunes and pans. Some Kalahari surface deposits in the form of pan deposits are present. The farms are on a level area on the northern edge of the Otavi Mountain Land, which is dominated by hills rising up to 500 m above the surrounding plains.

Drainage is poorly developed in the area. The site is located within the catchment of the Etosha Pan. The development of sinkholes, dolines and caves are common in the area. The slope of the project area is less than 5° with a slight dip towards the north. Elevation of the southern boundary of the project area is approximately 1,222 masl and 1,215 masl on the northern boundary.

Implications and Impacts

The lack of major surface runoff and drainage may lead to pooling and even flooding of plains during heavy rainfall events. This may negatively impact soil quality and cause localised flooding of infrastructure, if located in flood prone areas, or if such areas are not considered in designs. However, the flat terrain accommodates the use of the pivot irrigation systems as well as having a much lower soil erosion potential than that of sloped areas.

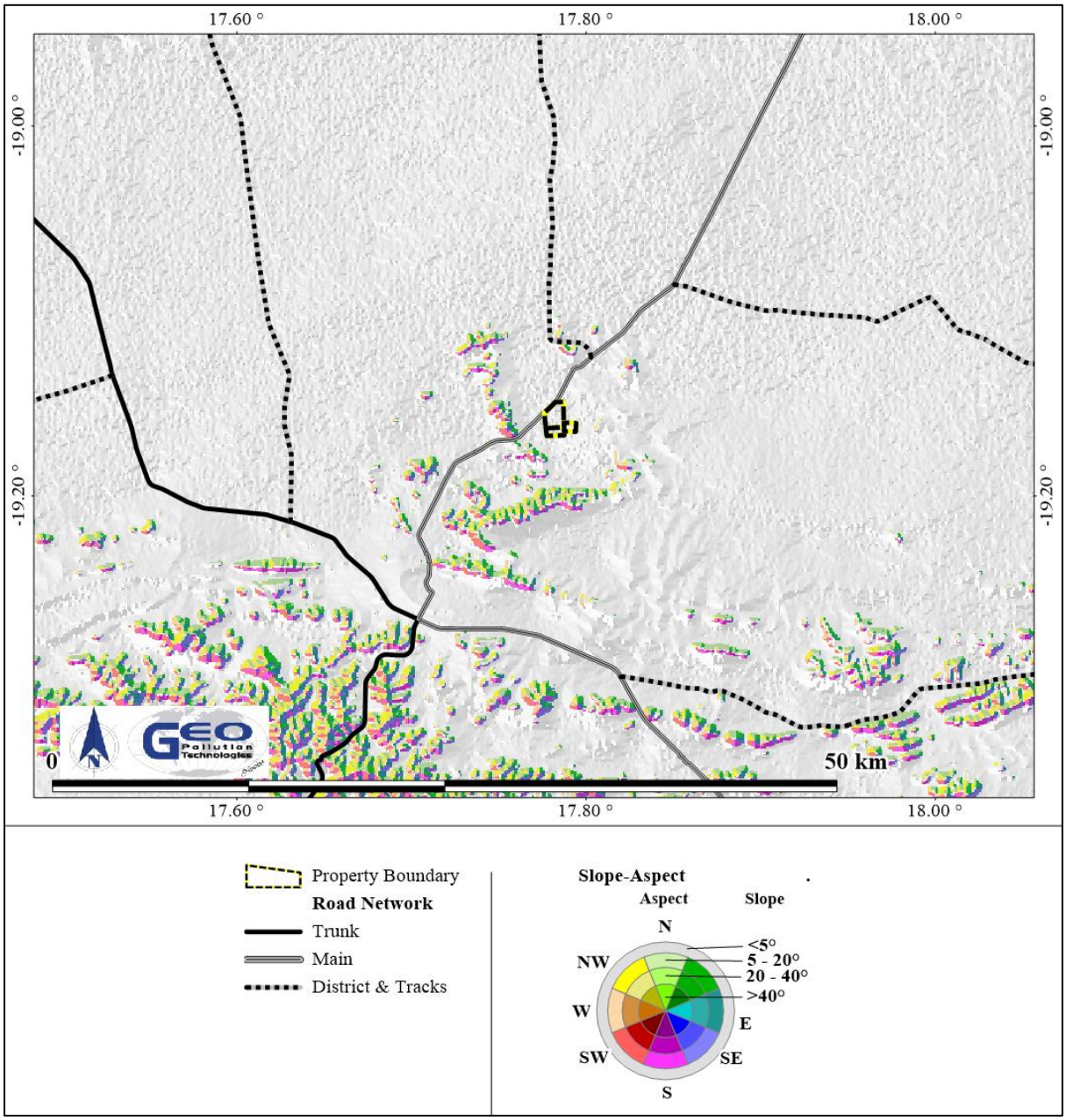


Figure 7-4 Aspect slope and surface drainage

7.4 SOIL

The soil type at the farming unit is dominantly Haplic Calcisol, which refers to undifferentiated soils with high lime concentrations in the subsoil and with the soil having the typical expression of the Soil Reference Group in the sense that there is no further or meaningful characterization. The composition of soil in this particular area is roughly 65-70 % sand, 10-15 % silt and 15-20 % clay which gives it the characteristics and texture of silty clay loam soil. Bulk density was computed to be 1,400-1,450 mg/cm³. Soils in this area typically reach depths of >190 cm. Soil sample analysis is periodically conducted to determine suitability and inform crop management. Soil sample results are further required to obtain GLOBALG.A.P certification.

The farming unit falls entirely within the Kalk-2 agro-ecological zone (AEZ). Kalk-2 is described as Kalkveld, having a median growing period of 91-120 days, a dependable growing period of 80% of the average. This AEZ is ranked 2nd in Namibia in terms of agricultural potential and is deemed most suitable for short-maturing crops and / or large stock grazing. The Kalk-2 area is

generally not regarded as suitable for cropping and this is true for the largest part. The areas under irrigation around Tsumeb are however located in patches where sufficiently deep, quality soil is present for irrigation of crops. The Proponent's entire farming unit has mostly suitable soils for crop production.

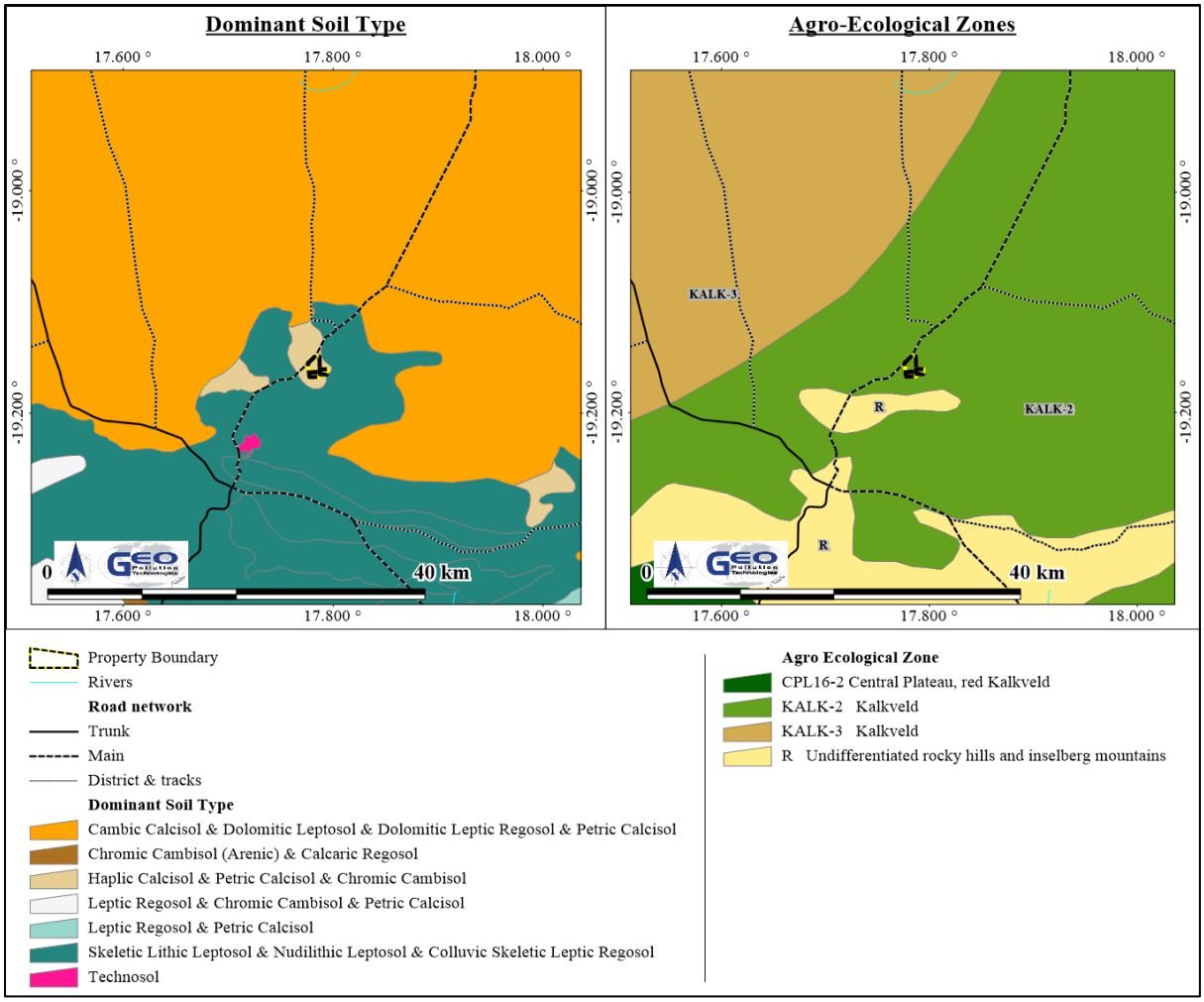


Figure 7-5 Dominant soil type and agro ecological zone

Implications and Impacts

Soils are suitable for irrigation-based crop cultivation. Ongoing crop-cultivation of more than 10 years on portions of the farm have not lead to soil degradation since these soils are still used for cultivation. Continued soil management measures will contribute to soil health preservation in future.

7.5 GEOLOGY AND HYDROGEOLOGY

The geology underlying the project area farms formed during the Quaternary and Tertiary Age. Locally the geology from the Quaternary and Tertiary Age comprises of the Kalahari Group deposits which consists of sand, calcrete and gravel. The Kalahari Group sediments originate mainly from fluvial deposition with some reworking through aeolian processes. Kalahari sediments at the project location form only a surface cover. The Kalahari Group sediments commonly overlie pre-Kalahari rocks, in this case dolostones belonging to the Elandshoek Formation of the Tsumeb Subgroup, that forms part of the Otavi Group in the Damara Sequence of Namibian Age (Schneider, 2004).

Moderate folding of the strata occurred during the Pan African Orogeny (680-450 Ma) and resulted in the formation of synclines and anticlines, generally trending east - west or north - south. The development of joints and fractures in the rocks are associated with the folding, which

have an impact on the hydrogeological characterization of the area. A synclinal structure with fold limbs dipping roughly toward the north and south occur in the eastern part of the project farm. See Figure 7-6 for the hydrogeology map of the area.

The main fault orientation is roughly northeast to southwest and northwest to southeast. Geophysical-interpreted dykes occur in the area and strike towards the northeast. Figure 7-6 depicts geological structures interpreted from geophysical data for these farms and surrounding area. The Tsumeb dyke is located along the northwestern border of the farm. The nature of the dykes tend to be a mineralised fault with high hydraulic conductivity values. The Tsumeb dyke represented a major exploration target for the NamWater exploration water supply programme to Windhoek. The dykes are thought to have shattered the host rocks during its formation (Hoad, 1992). Where dolomite is the host rock, it forms a zone favourable for the development of karst features and groundwater accumulation.

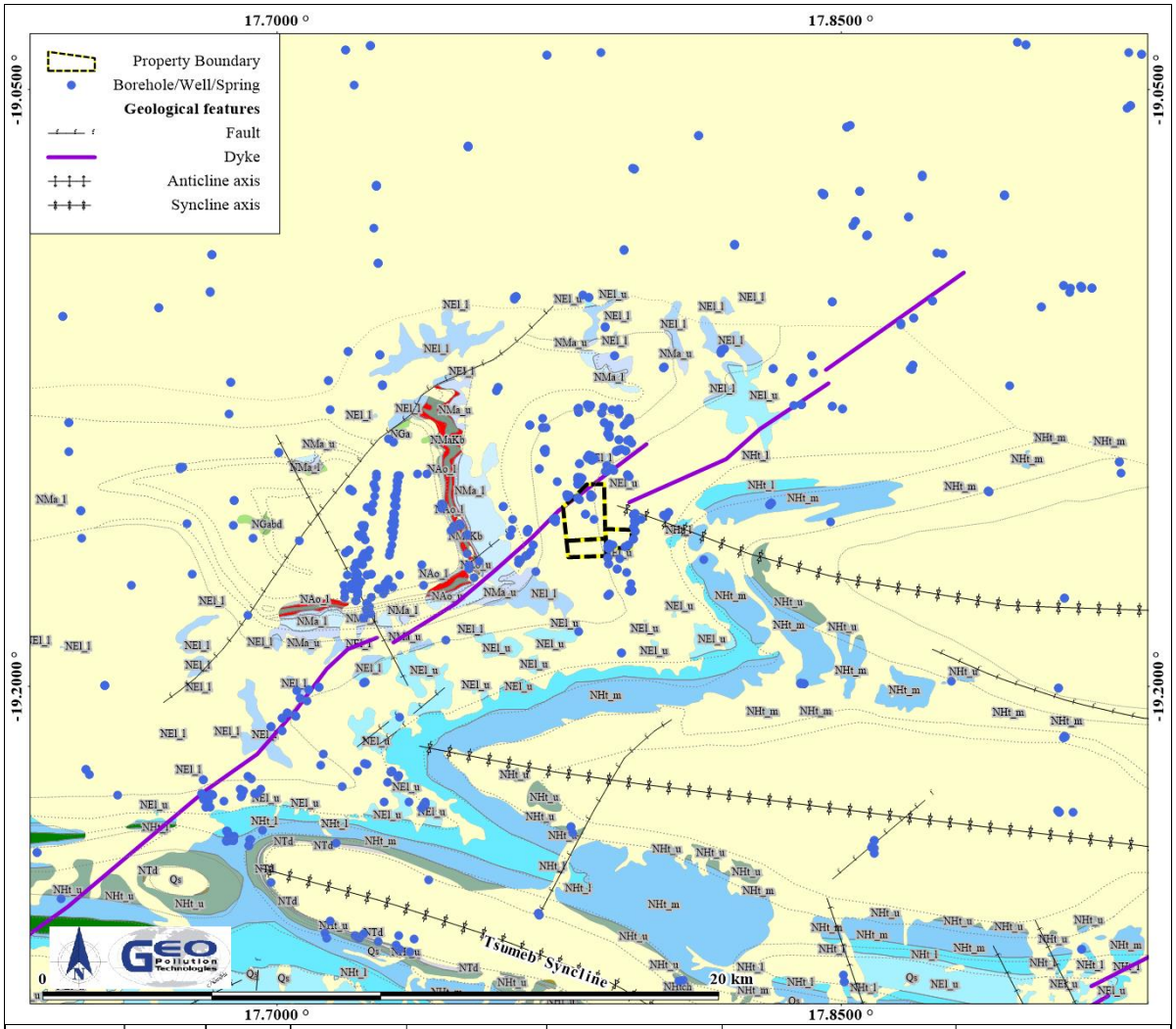
The Tsumeb Mine is also located approximately 11 km to the southwest of the project area farms. This hydrothermal deposit represents a highly mineralized zone of which metals like lead, copper and zinc were mined until 1996 when the mine was flooded and subsequently closed (Grünert, 2000).

A number of springs are present in the Otavi Mountain land and most of these springs are related to the contact zones between relatively impermeable formations and more permeable formations. The nearest of these contact zone springs is present approximately 38 km to the southeast of the project farms (Figure 7-6). The only nearby spring present within the area covered by Kalahari sediments is present on the farm La Rochelle, 22 km northeast of the project area. No caves or lakes are known of near (<10 km radius) the project area.

The project location is situated in the Owambo Groundwater Basin. Localised groundwater flow may take place along preferred flow paths in different directions, but the larger scale groundwater flow is expected to be in a northern direction (Figure 7-7). Local flow patterns may vary due to groundwater abstraction. Groundwater flow is expected to take place through primary porosity in the surface cover, while it is expected to flow along fractures, faults, dykes/mineralised faults or along contact zones (secondary porosity) and other geological structures present within the underlying formations (hard rock formations). Contact zones in the area occur between bedded and massive dolostone and creates favourable conditions to promote groundwater flow.

Groundwater quality data is presented in Figure 7-8 as Maucha plots. From the figure it is clear that the groundwater of the project location is mostly of a calcium-magnesium-bicarbonate type water which suggest the water is recently recharged. Groundwater quality from the project area reflect an aquifer that is typical of a dolomitic hard rock formation host where rapid groundwater recharge takes place.

Groundwater statistics of 53 boreholes in a 5 km radius suggest that the water quality is generally good (Table 7-3) with some elevated nitrate concentrations observed in approximately 25% of the data. Boreholes were mostly drilled less than 49 m deep. The groundwater information was obtained from Department of Water Affairs (DWA) borehole database and from the proponent. The DWA database is generally outdated and more boreholes might be present. Some boreholes might also be abandoned and not utilised.



Age	Lithcode	Sequence	Group	Subgroup	Formation	Rocktypes	Remarks
Quaternary	Qs					sand, gravel, calcrete	
Namibian	NTd	Damara	Mulden		Tschudi	quartzite;greywacke;arkose	
	NMD					phyllite	sandstone; greywacke; conglomerate
	NHt		Otavi	Tsumeb	Huttenberg	dolostone	limestone; chert; shale
	NHt_l					dolostone (bedded)	chert (algal)
	NHt_m					dolostone (bedded)	phyllite
	NHt_u					dolostone (bedded)	
	NHtl					limestone	shale
	NEl				Elandshoek	dolostone	
	NEl_l					dolostone (massive)	
	NEl_u					dolostone (bedded)	
	NElch					chert	
	NMa_u				Maieberg	dolostone (bedded)	
	NMa_l					limestone/marl (bedded)	
	NMa					limestone; dolostone	
	NTM					dolostone; limestone	chert
	NGh		Swakop/ Otavi	Usakos/ Abenab	Ghaub	diamictite	
	NCh				Chuos	diamictite; pebbly schist	quartzite; conglomerate; dolostone; shale
	NBa		Otavi	Abenab	Auros	limestone; dolostone	shale
	NEl				Gauss	dolostone (massive)	
	NAo				Berg Aukas	dolostone (laminated; light/dark)	
	NAB					dolostone	limestone; shale
	NOT					dolostone; limestone	chert;sandstone (calcareous) grit (dolomitic)
	Nkb		Swakop	Khomas	Karibib	Marble, schist, ortho-amphibolite, quartzite	
	NNb		Nosib		Nabis	quartzite; arkose	conglomerate; shale
Mokolian	Mhu					Para-/orthogneiss, metasedimentary rocks, granite, metabasite dykes	

Figure 7-6 Hydrogeological map

Table 7-3 Groundwater statistics

Query Centre:	Plot Neseier; -19.1535°S; 17.7813°E										Query Box Radius: 5.0km
	NUMBER OF KNOWN BOREHOLES	LATITUDE	LONGITUDE	DEPTH (mbs)	YIELD (m3/h)	WATER LEVEL (mbs)	WATER STRIKE (mbs)	TDS (ppm)	SULPHATE (ppm)	NITRATE (ppm)	FLUORIDE (ppm)
Data points	**53**			9	7	10	4	4	4	4	4
Minimum		-19.108504	17.733667	5	4	2	10	357	4	0	0
Average				32	20	15	21	678	99	13	1
Maximum		-19.198496	17.828933	49	72	27	35	1272	305	44	1
Group A				100.00%	57.14%	30.00%	25.00%	75.00%	75.00%	75.00%	100.00%
Limit				50	>10	10	10	1000	200	10	1.5
Group B				0.00%	28.57%	70.00%	75.00%	25.00%	25.00%	0.00%	0.00%
Limit				100	>5	50	50	1500	600	20	2.0
Group C				0.00%	14.29%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Limit				200	>0.5	100	100	2000	1200	40	3.0
Group D				0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	25.00%	0.00%
Limit				>200	<0.5	>100	>100	>2000	>1200	>40	>3

Statistical grouping of parameters is for ease of interpretation, except for the grouping used for sulphate, nitrate and fluoride, which follow the Namibian guidelines for the evaluation of drinking-water quality for human consumption, with regard to chemical, physical and bacteriological quality. In this case the groupings has the following meaning:

Group A: Water with an excellent quality
Group B: Water with acceptable quality
Group C: Water with low health risk
Group D: Water with a high health risk, or water unsuitable for human consumption.

According to the Ministry of Agriculture, Water and Forestry (MAWF, 2006) the farms are located inside the Tsumeb-Otavi-Grootfontein Subterranean Water Control Area, Government Notice 1969 of 13 November 1970 and Proclamation 278 of 31 December 1976 (Extension). The farms also fall under a sub-division of the water control area (Tsumeb - B2), known as the eastern half of the Tsumeb-Abenab Synclinorium sub-catchment (Bäumle, 2004). Government regulates groundwater usage in this area and all other groundwater related activities like drilling, cleaning or deepening of boreholes and rates of water abstraction. See Figure 7-7 for a map indicating the water control area, groundwater basin and inferred groundwater flow.

The aquifer has a high hydraulic conductivity and over abstraction may cause the formation of a localised cone of depression. Although high volume abstraction currently takes place in the Otavi Mountain Land, the only significant cones of depression known to exist were at the Tsumeb mine (Hoad, 1992) and at the Kombat mine, which is situated much further south (Figure 7-6).

During the peak activities of the Tsumeb mine, the water level was decreased to a depth of about 1,700 m. Groundwater was abstracted on average at 500 m³/h to 600 m³/h and during peak times at 1,000 m³/h. This abstraction lasted for several decades, with a stable cone of depression that developed at a radius of approximately 2 km around the mine shaft (GKW Consult, et. al.; 2003).

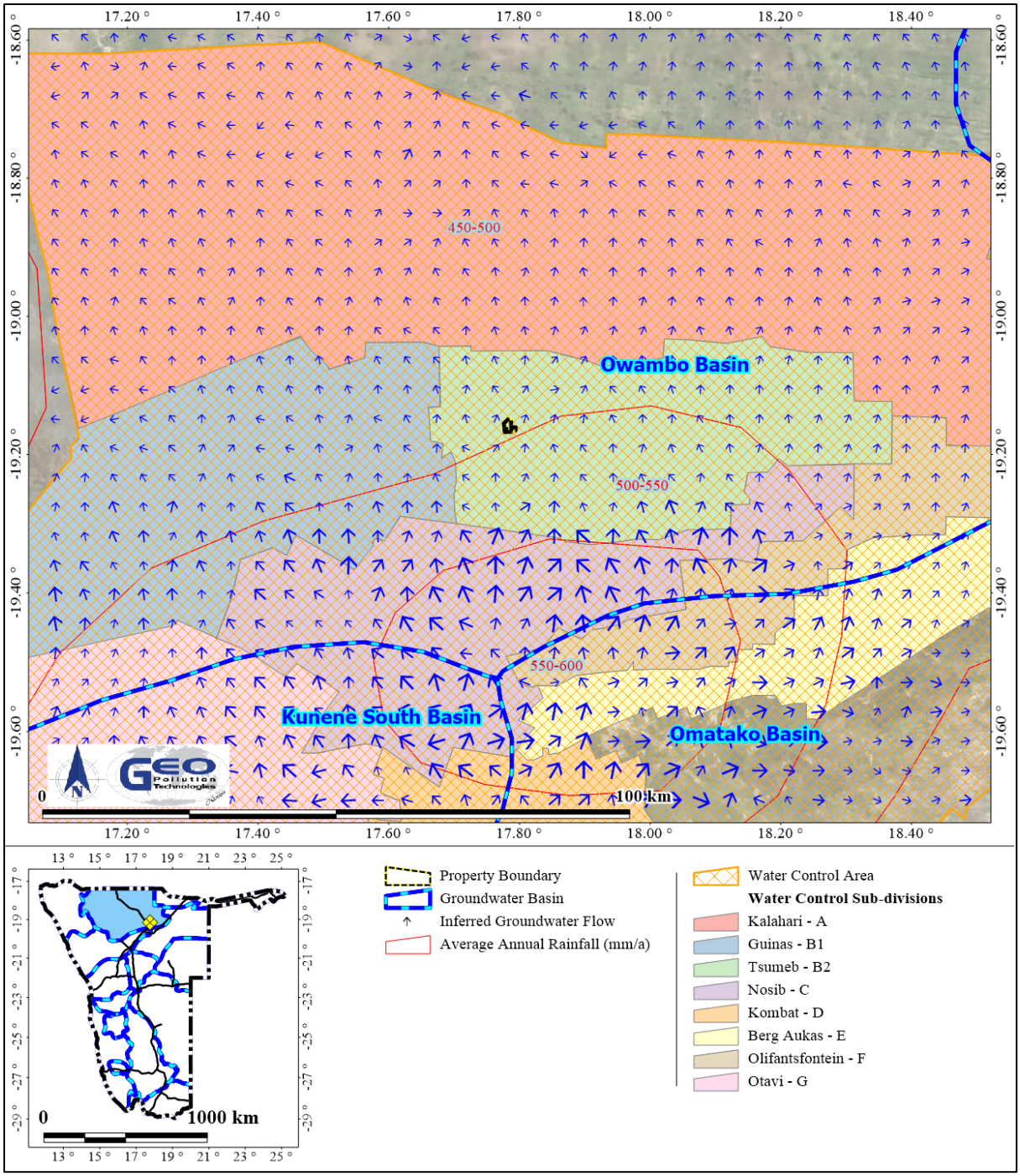


Figure 7-7 Groundwater basin with rainfall and inferred groundwater flow

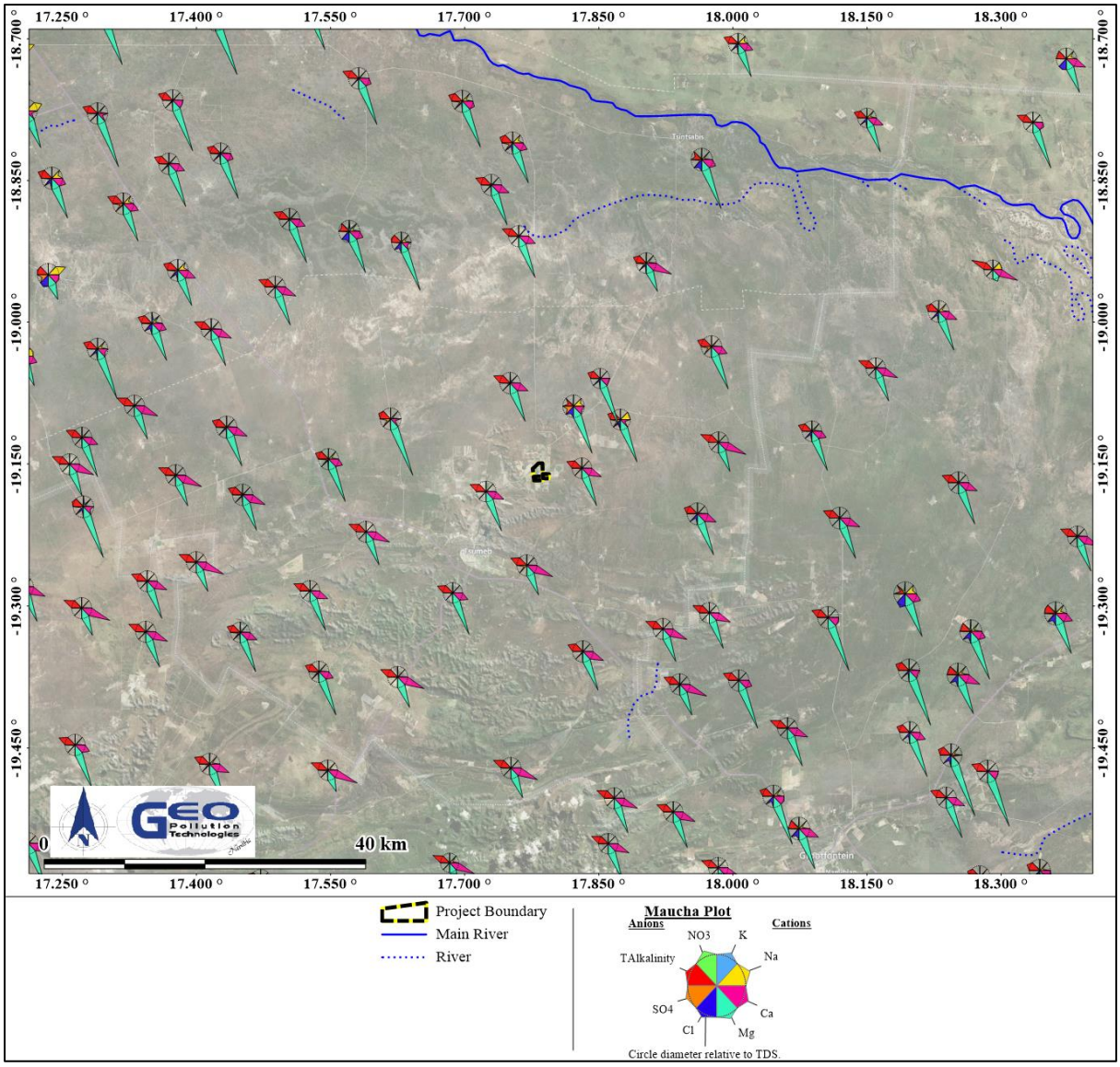


Figure 7-8 Groundwater quality

Implications and Impacts

A risk to groundwater pollution could be expected if for example a hazardous substance spill occur due to the geological sensitivity of the area. Karstic aquifers is very susceptible to pollution due to rapid infiltration through formation fractures in the hard rock formations. Groundwater is utilized in the area and such users would be at risk if groundwater contamination occurs. Irresponsible irrigation methods like over-irrigation may result in higher demands for fertiliser, herbicides and pesticides, which in turn will increase nitrates, herbicide and pesticide concentration in the groundwater. Over abstraction may also impact on other users of the aquifer.

7.6 PUBLIC WATER SUPPLY

The only available potable water supply in the area is groundwater. The Tsumeb Municipality supplies residents and businesses with water obtained from boreholes roughly grouped in three areas: Extension 8, Nomtsoub and Extensions 6 and 7. The boreholes in the Nomtsoub Group have the highest yields. Farms in the area all rely on boreholes for water supply for potable and agricultural use.

Implications and Impacts

Groundwater is a valuable resource in the area. Groundwater contamination may negatively impact surrounding boreholes, widely utilised for public water supply for both agricultural purposes and potable use. No alternative water supply options exist if extensive contamination or deterioration of groundwater occur.

7.7 ECOLOGY

The farms is situated in the Savanna Biome and has Karstveld vegetation with a Woodland structure. Namibia's biodiversity pattern is characterised by low species diversity, but high endemism, in the west and southwest of the country, while high species diversity, but low levels of endemism, is present towards the northeast. Plant and animal diversity on Neseier, Uitkoms and Baobab are therefore expected to be relatively high, but with low endemism.

Plant diversity is expected to be in the vicinity of 400 to 500 species, the second highest diversity category for Namibia. Trees such as *Colophospermum mopane, Terminalia prunioides, Commiphora* species, *Combretum apiculatum, Acacia reficiens, Dichrostachys cinerea* and a variety of other trees are characteristic of the Karstveld vegetation type. Table 7-4 and Table 7-5 present a summary of the general plant and animal diversity of the broader area.

Neseier, Uitkoms and Baobab are located in quarter degree square (QDS) 1917BB. According to the Tree Atlas Project, 82 different tree species occur in these quarter degrees (Curtis & Mannheimer 2005). Trees from this list that are protected by legislation in Namibia are presented in Table 7-6. Notes on conservation status / concerns are also provided. Most of the vegetation on the faming unit was altered by historical farming practises. Various large trees have been incorporated around the faming property, however the game camp is left largely undisturbed as far as possible, and have numerous large trees. Not all the trees listed are expected to occur on the farm.

Photo 7-1 Large trees within the project area

Photo 7-2 Large trees within the wildlife camp

Various species of small mammals (mice and hare), birds (eagles, owls, Guinea fowl, francolin and grouse), reptiles (snakes and lizards) and other animal taxa are present. Considering the broader environment of the Karstveld, various aquatic species occur in the lakes (e.g. Otjikoto and Guinas), caves and springs in the area (Irish 1991). High levels of endemism exist among them, mainly due to the isolated nature of the lakes and caves. Endemic species include two species of fish, the Otjikoto Tilapia and Cave catfish. Amphipods occur in the groundwater in the area and include two species, *Stygobarnardia caprellinoides* and *Troglolelеupia eggerri*, which occur in the Tsumeb area and are regularly pumped from boreholes (Irish 1991). Springs support various animals, many being relatively common and widespread. However, possible range restricted species, which are either poorly described, or not described at all, may also occur here.

Table 7-4 General plant data (Atlas of Namibia Project, 2002)

Biome	Savanna
Vegetation type	Karstveld
Vegetation structure type	Woodland
Diversity of higher plants	High (Diversity rank = 2 [1 to 7 representing highest to lowest diversity])
Number of plant species	400-500
Percentage tree cover	11 - 25
Tree height (m)	2 – 5
Percentage shrub cover	51 – 75
Shrub height (m)	1 – 2
Percentage dwarf shrub cover	2 – 10
Dwarf shrub height (m)	< 0.5
Percentage grass cover	26 – 50
Grass height (m)	< 0.5
Dominant plant species	*Colophospermum mopane; Terminalia prunioides; Commiphora* species*; Combretum apiculatum; Acacia reficiens; Dichrostachys cinerea*

Table 7-5 General animal data (Atlas of Namibia Project, 2002)

Mammal Diversity	76 - 90 Species
Rodent Diversity	24 - 27 Species
Bird Diversity	171 - 200 Species
Reptile Diversity	71 - 80 Species
Snake Diversity	35 - 39 Species
Lizard Diversity	24 - 27 Species
Frog Diversity	12 - 15 Species
Termite Diversity	7 - 9 Genera
Scorpion Diversity	6 - 9 Species

Table 7-6 Trees with conservation concerns in quarter degree square 1915BD (Curtis & Mannheimer 2005)

Name	Common Name	Notes
Acacia erioloba	Camel-thorn	Protected by forestry legislation
Acacia mellifera subsp *detinens*	Blue-thorn Acacia	Aggressive invader
Acacia reficiens subsp *reficiens*	Red-thorn	Aggressive invader
Albizia anthelmintica	Worm-cure Albizia; Aru	Protected by forestry legislation
Aloe littoralis	Windhoek Aloe	Potentially threatened by pachycaul trade. Protected by the Nature Conservation Ordinance and listed in CITES Appendix II
Berchemia discolor	Bird Plum	Protected by forestry legislation
Boscia albitrunca	Shepherd's Tree	Protected by forestry legislation

Name	Common Name	Notes
Catophractes alexandri	Trumpet-thorn;Rattlepod	Invasive in some areas
Combretum imberbe	Leadwood	Protected by forestry legislation
Cyphostemma juttae	Blue Kobas	Endemic with very small population and threatened with pachycaul trade. Least concern according to IUCN criteria. Protected by Nature Conservation Ordinance. Protected by forestry legislation
Datura spp	Thorn apple	Alien with invasive tendencies
Dichrostachys cinerea subsp *africana*	Kalahari Christmas Tree; Sickle-bush	Invasive
Erythrina decora	Namib Coral-tree	Endemic to Namibia and very uncommon throughout its range. Protected by forestry legislation
Euphorbia guerichiana	Paper-bark Euphorbia	CITES Appendix II
Ficus cordata subsp *cordata*	Namaqua Rock-fig	Protected by forestry legislation
Ficus sycomorus	Sycamore Fig	Protected by forestry legislation
Hyphaene petersiana	Makalani Palm	Protected by forestry legislation
Maerua schinzii	Ringwood Tree	Protected by forestry legislation
Pachypodium lealii	Bottle Tree	Vulnerable to pachycaul trade. Protected by nature conservation ordinance. Listed on CITES Appendix II. Near-endemic extending into extreme southern areas of Angola. Protected by forestry legislation
Ricinus communis	Castor-oil Bush	Alien with invasive tendencies
Sclerocarya birrea	Marula	Protected by forestry legislation
Spirostachys africana	Tamboti	Protected by forestry legislation
Ziziphus mucronata	Buffalo-thorn	Protected by forestry legislation

Implications and Impacts

Agricultural activities on Neseier, Uitkoms and Baobab have long been established and no additional habitat disturbance (land clearing) is expected in the near future. Poaching and illegal collection of plant and animal material may impact on the local environment. Pollution of the soil and groundwater by hazardous chemicals and / or the excessive use of fertilizers and pesticides may negatively impact the local ecology.

Over-abstraction of groundwater may lead to ecosystem changes as groundwater levels decrease. Deep rooted terrestrial plants that dependent on groundwater, will dry out and eventually die and animals dependent on springs will migrate or die. The impact of possible decreases in groundwater level may impact on aquatic organisms in lakes, caves and groundwater. The possible extent of impact is uncertain due to a lack of scientific information on these organisms' ecology and habitat.

7.8 DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS

The project area is located in the Oshikoto Region with a population of 195,165 and a density of approximately 5 people per km^2 based on the inter-censal demographic survey results of 2016 (Namibia Statistics Agency, 2017). Table 7-7 provides some inter-censal demographic survey results for the Oshikoto Region and nationally, while the 2011 census results are provided for the Tsumeb Constituency (Namibia Statistics Agency, 2011; Namibia Statistics Agency, 2017).

Agriculture is the largest employment sector in the Oshikoto Region with almost 50% of the workforce being employed in this sector (Table 7-8).

Table 7-7 Demographic characteristics of the Tsumeb Constituency, the Oshikoto Region and Nationally (Namibia Statistics Agency, 2011; Namibia Statistics Agency, 2017)

	Tsumeb Constituency*	Oshikoto Region**	Namibia**
Population (Males)	9,841	94,100	1,129,754
Population (Females)	9,999	101,065	1,194,634
Population (Total)	19,840	195,165	2,324,388
Population Density	73.2/km^2	5.0/km^2	2.8/km^2
Literacy (15+ years)	89%	88%	89%

* Data from 2011 census

** Data from 2016 inter-censal demographic survey

Table 7-8 Main industry of employed population aged 15 years and above by sex (Namibia Statistics Agency, 2011)

Main Industry	Employed Population
Total	36,638
Agriculture forestry and fishing	17,860
Mining and quarrying	929
Manufacturing	1,123
Electricity gas steam and air conditioning supply	44
Water supply sewerage waste management and remediation activities	58
Construction	1,713
Wholesale and retail trade; repair of motor vehicles and motorcycles	1,880
Transportation and Storage	997
Accommodation and food service activities	963
Information and communication	134
Financial insurance activities	279
Real estate activities	3
Professional scientific and technical activities	260
Administrative and support service activities	2,435
Public administration and defence; compulsory social security	1,464
Education	2,285
Human health and social work activities	975
Arts entertainment and recreation	88
Other Services activities	682
Activities of Private Households	2,229
Activities of extraterritorial organisation and bodies	8
Don't know	229

Implications and Impacts

The development provides full time as well as seasonal employment to people from the area. Some skills development and training also benefit employees during the operational phase.

The long standing agricultural activities provide sustainable employment while further increasing the economic resilience of workforce, contractors and service providers in the area.

7.9 ARCHAEOLOGICAL, PALAEONTOLOGICAL AND HERITAGE CONSIDERATIONS

There are no cultural, heritage or archaeological aspects known to be present on the farm. However, farming activities have been conducted in on the farm for almost 50 years. There are however no buildings or graves on site which may be regarded to have historical value. The proximity of the farm to Tsumeb allows for easy integration to cultural and related services for employees.

Implications and Impacts

No implications or expected impacts.

8 PUBLIC CONSULTATION

Consultation with the public forms an integral component of an environmental assessment investigation. It enables Interested and Affected Parties (IAPs) e.g. neighbouring landowners, local authorities, environmental groups, civic associations and communities, to comment on the potential environmental impacts associated with a project. This aid in identification of additional impacts or concerns which should be addressed in the environmental assessment.

The public consultation process followed the procedures as stipulated in the regulations of the EMA. Public participation notices were advertised once a week for two weeks in the national papers: In the Republikein and the Namibian Sun on 28 November and 05 December 2022. A site notice was placed on site and notification letters were sent via email or hand delivered to neighbours and authorities. See Appendix D for proof of the public participation processes and the registered IAPs. Notified authorities and IAPs provided no comments or responses regarding the agricultural activities and operations of the Proponent.

9 MAJOR IDENTIFIED IMPACTS

A number of potential environmental impacts were identified during the environmental scoping exercise. The following section provides a brief description of the most important of these impacts.

9.1 SOIL AND GROUNDWATER CONTAMINATION

Soil and groundwater contamination are possible when large quantities of fertilizers or pesticides are applied. Excessive fertilizer use may result in increased soil nutrient levels (i.e. nitrogen, phosphorus and potassium), to a point that soil is regarded as contaminated. Similarly, pesticides can accumulate in soil at levels detrimental to biota. Fertilizers and pesticides can leach deeper into the ground and eventually reach and contaminate groundwater. Chemical spills, inclusive of fertilizers and pesticides, may result in very high but localised contamination of soil, increasing the risk of groundwater if spill clean-up is not performed.

Hydrocarbon pollution resulting from the spilling of fuel, oil or hydraulic fluids is possible. Tractor and other vehicle breakdowns or incorrect refuelling and storage of fuel are the most likely causes of hydrocarbon pollution. Contamination of the environment may also occur if hazardous substances such as pesticides are stored or handled incorrectly and a spill occur, or if pesticides are applied excessively.

9.2 GROUNDWATER ABSTRACTION

For a detailed assessment of groundwater abstraction and supply, refer to the hydrogeological assessment in Appendix B.

Groundwater abstraction is a very sensitive topic in a dry country where the value of land is drastically reduced if no or unusable groundwater is present on the land. Abstraction of groundwater must be done in a sensible way not to impact on other groundwater users that depend on such groundwater. This includes water abstracted for human and animal use, irrigation, and

also ecosystems that depend on groundwater. A typical groundwater balance was compiled to illustrate the potential consequences of over abstraction of groundwater, see Figure 9-1. Recharge to the area is considered to be high. It is considered that recharge can vary from 0% to 4% of rainfall with an average of 2% of the rainfall. In periods of drought there may be no recharge while in above average rainfall recharge could be above 4% (Hoad, 1992).

In a typical groundwater environment, a water balance would consist of inflow and outflow of the groundwater system. Over time an equilibrium (or steady state) is normally reached with rising water tables following good recharge events and declining water tables when recharge is below average.

Inflow into the system would typically be from infiltration following rainfall in the area and in upstream areas. The inflow component will further be enhanced by the high secondary porosity nature of the karst aquifer.

Outflow would be comprised of water leaving the system through springs and as outflow over the lower boundary of the groundwater system as well as evapotranspiration losses. Groundwater abstraction through boreholes is important as this is normally necessary to sustain human and animal demands where such users became essentially dependant on the abstracted groundwater as a reliable and sustainable source.

Typical consequences of over abstraction will include a lowering in the water table. This may lead to the collapse of underground cave roofs where the hydrostatic pressure, used to support the roof of a cave, decrease. The increased flow of water may enhance the dissolution of dolomitic rock, leading to an increase in karst structures. Lowering of water tables may further lead to the drying up of boreholes, springs, underground caves and the subsequent loss of organisms that lives in the subsurface and surface water. Vegetation will also be impacted where such vegetation has access to groundwater.

Based on current water level fluctuations in the area, as presented in the hydrogeological assessment (Appendix B), a short term threshold of 5 m below the long term average water level is set from where abstraction rates should be reduced. Note that this level refers to rest water levels and not pump water levels.

All boreholes should be equipped with a dipper pipe to enable safe water level measurements.

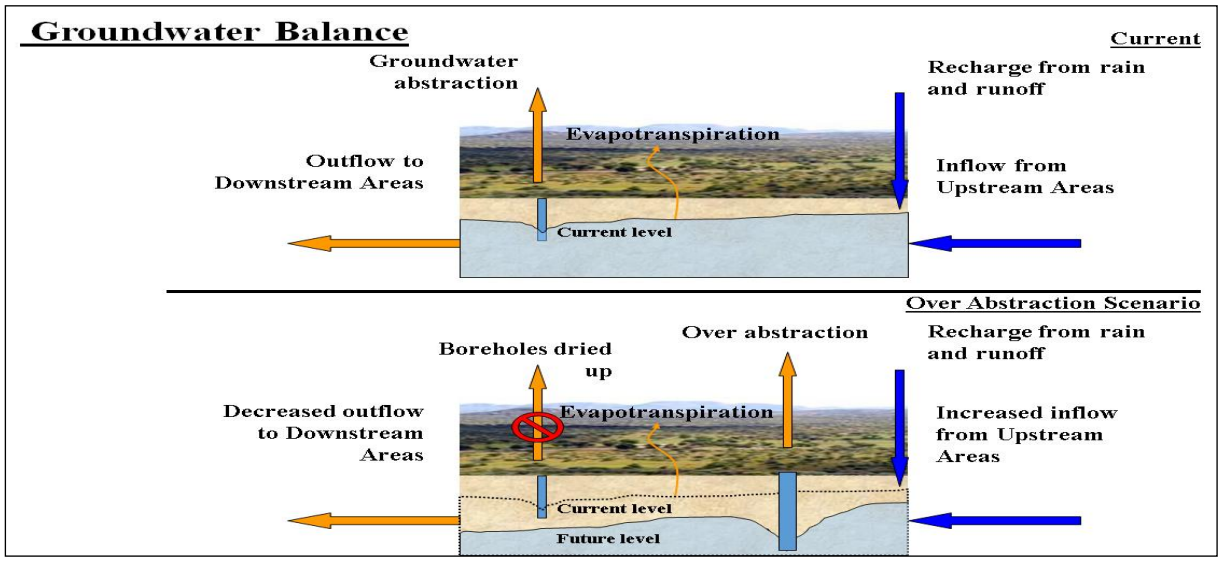


Figure 9-1 Conceptual groundwater balance with over abstraction scenario

9.3 FIRE

A risk of veld fires exist. Fires, used for example to cook food in areas not designated for this purpose, may spread to the nearby veld. Machinery can ignite dry vegetation if sufficient heat (e.g. exhaust pipes) or sparks are produced. Chemicals and fuels stored and used for general

activities may be flammable. Electrical shorts on the electricity supply network can cause fires in buildings. Lightning can be a natural ignition source for veld fires which in turn can spread and damage infrastructure and crops or pose health impacts.

9.4 DUST AND AIR QUALITY

Dust may become a nuisance and health risk when land is ploughed, tilled or prepared for planting. Strong winds present during periods when fields are dry and barren, such as in-between planting cycles, may aggravate dust impacts.

9.5 TRAFFIC

Additional traffic is present on the main road as a result of the activities on the farm. This include the transport of staff, the delivery of fertilizers, seed, etc., as well as the transport of crops to markets. Since it is an existing operation with no short term plans for expansion, traffic impacts related to the activities of D J van der Berg will remain the same, and no additional impacts are expected.

9.6 HEALTH AND SAFETY

Injuries related to working with machinery, chemicals, pesticides, etc. can occur. Inhalation and dermal contact with pesticides are possible where pesticides are for example applied by means of tractor mounted sprayers or via the irrigation system. Spray drift in windy conditions can reach nearby workers or the tractor driver. Vehicle accidents involving staff when transported to and from work in busses, or during movement of machinery like tractors on the farm, can occur. Venomous animals like snakes, scorpions and spiders may be present. Neseier, Uitkoms and Baobab falls within a malaria risk area with 100 to 300 malaria cases for every 1,000 people in the area (Atlas of Namibia Project, 2002).

9.7 ECOSYSTEM AND BIODIVERSITY IMPACT

No additional land clearing is foreseen in the near future. Poaching and illegal collection of plant and animal material by staff and / or non-staff members is possible. Pollution of the environment and groundwater, especially by fuel, pesticides and fertilizers, can deteriorate or alter the ecosystem structure and function. Over-abstraction of groundwater can impact on aquatic organisms living in the groundwater. Due to the endemic nature of such aquatic organisms, the continued pumping of water that results in the extraction of for example amphipods, may detrimentally affect population sizes and viability.

9.8 SOCIO-ECONOMIC IMPACTS

The project contribute to food security at a national level and meets some of the objectives of the various NDP goals in terms of agricultural productivity. Twenty permanent employees and up to 150 seasonal employees work on the farms. Housing and amenities are available to permanent employees and their families. Proper sanitation facilities are present for all workers.

Income is generated with a positive impact on the Namibian GDP. The sale of high value crops to international clients contribute towards a positive trade balance for Namibia.

Existing and planned developments typically entice jobseekers to migrate to the area. This may lead to high levels of unemployment and the social ills therewith associated. This include increased spread of HIV/AIDS and other diseases, alcohol or drug abuse, and theft or violence.

10 ASSESSMENT AND MANAGEMENT OF IMPACTS

The purpose of this section is to assess and identify the most pertinent environmental impacts expected from the operational, construction (care and maintenance) and potential decommissioning activities of the farm (agricultural and related activities on Neseier, Uitkoms and Baobab). An EMP based on these identified impacts is present in this section. The EMP provides preventative and mitigation measures to limit or reduce potential impacts to acceptable levels.

For each impact, an environmental classification was determined based on an adapted version of the Rapid Impact Assessment Method (Pastakia, 1998). Assessment of impacts are based on the following categories: importance of condition (A1); magnitude of change (A2); permanence (B1); reversibility (B2); and cumulative nature (B3) (Table 10-1).

The environmental classification is calculated as follows:

Environmental classification = A1 x A2 x (B1 + B2 + B3)

The environmental classifications of impacts and the respective classes are provided in Table 10-2.

The probability ranking refers to the probability that a specific impact will happen following a risk event. These can be improbable (low likelihood); probable (distinct possibility); highly probable (most likely); and definite (impact will occur regardless of prevention measures).

Table 10-1 Assessment criteria

Criteria	Score
Importance of condition (A1) – assessed against the spatial boundaries of human interest it will affect	
Importance to national/international interest	4
Important to regional/national interest	3
Important to areas immediately outside the local condition	2
Important only to the local condition	1
No importance	0
Magnitude of change/effect (A2) – measure of scale in terms of benefit / disbenefit of an impact or condition	
Major positive benefit	3
Significant improvement in status quo	2
Improvement in status quo	1
No change in status quo	0
Negative change in status quo	-1
Significant negative disbenefit or change	-2
Major disbenefit or change	-3
Permanence (B1) – defines whether the condition is permanent or temporary	
No change/Not applicable	1
Temporary	2
Permanent	3
Reversibility (B2) – defines whether the condition can be changed and is a measure of the control over the condition	
No change/Not applicable	1
Reversible	2
Irreversible	3
Cumulative (B3) – reflects whether the effect will be a single direct impact or will include cumulative impacts over time, or synergistic effect with other conditions. It is a means of judging the sustainability of the condition – not to be confused with the permanence criterion.	
Light or No Cumulative Character/Not applicable	1
Moderate Cumulative Character	2
Strong Cumulative Character	3

Table 10-2 Environmental classification (Pastakia 1998)

Environmental Classification	Class Value	Description of Class
72 to 108	5	Extremely positive impact
36 to 71	4	Significantly positive impact
19 to 35	3	Moderately positive impact
10 to 18	2	Less positive impact
1 to 9	1	Reduced positive impact
0	-0	No alteration
-1 to -9	-1	Reduced negative impact
-10 to -18	-2	Less negative impact
-19 to -35	-3	Moderately negative impact
-36 to -71	-4	Significantly negative impact
-72 to -108	-5	Extremely Negative Impact

10.1 RISK ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN

The EMP provides management options to ensure impacts of the agricultural and related activities are minimised. An EMP is a tool used to take pro-active action by addressing potential problems before they occur. This should limit corrective measures needed, although additional mitigation measures might be included if necessary. The environmental management measures are provided in the tables and descriptions below. These management measures should be adhered to during the various phases of the operation and maintenance / construction of the farm. This section of the report can act as a stand-alone document. All personnel taking part in the operations of the farm should be made aware of the contents of this section, so as to plan the operations accordingly and in an environmentally sound manner.

The objectives of the EMP are:

- to include all components related to operational and construction activities of the farming unit;
- to prescribe the best practicable control methods to lessen the environmental impacts associated with the farming unit;
- to monitor and audit the performance of operational personnel in applying such controls; and
- to ensure that appropriate environmental training is provided to responsible operational personnel.

Various potential and definite impacts will emanate from the operations, maintenance / construction and decommissioning phases. The majority of these impacts can be mitigated or prevented. The impacts, risk rating of impacts, as well as prevention and mitigation measures are listed below.

As depicted in the tables below, impacts related to the operational phase are expected to mostly be of medium to low significance and can mostly be mitigated to have a low significance. The extent of impacts are mostly site specific to local and are not of a permanent nature. Due to the nature of the surrounding areas, cumulative impacts are possible and the most important of these are potential groundwater impacts.

10.1.1 Planning

During the phases of planning for the operations, maintenance / construction and decommissioning phases of the farm, it is the responsibility of Proponent to ensure they are and remain compliant with all legal requirements. The Proponent must also ensure that all required management measures are in place prior to, and during all phases, to ensure potential impacts and risks are minimised. The following actions are recommended for the planning phase and should continue during various other phases of the project:

- Ensure that all necessary permits from the various ministries, local authorities and any other bodies that governs the operations, maintenance / construction and decommissioning activities remains valid. These include the consumer fuel installation certificate and the water abstraction permits.
- Ensure all appointed contractors and employees enter into an agreement, which includes the EMP. Ensure that contractors, sub-contractors, employees and all personnel present on site understand the contents of the EMP.
- Make provisions to have a health, safety and environmental coordinator to implement the EMP and oversee occupational health and safety as well as general environmental related compliance at the site.
- Make provision for a community liaison officer to deal with complaints.
- Have the following emergency plans, equipment and personnel on site, where reasonable, to deal with all potential emergencies:
    - EMP / risk management / mitigation / emergency response plan and health safety and environment (HSE) manuals;
    - Adequate protection and indemnity insurance cover for incidents;
    - Procedures, equipment and materials required for emergencies.
- Establish and maintain a fund for future ecological restoration of the project site should project activities cease and the site is decommissioned or when environmental damage is caused during operations and environmental restoration or pollution remediation is required.
- Establish and / or maintain a reporting system to report on aspects of operations, maintenance / construction, and decommissioning as outlined in the EMP.
- Keep monitoring reports on file for bi-annual submission to MEFT in support of environmental clearance certificate renewal applications. This is a requirement by MEFT.
- Appoint a specialist environmental consultant to update the EA and EMP and apply for renewal of the environmental clearance certificate prior to expiry.

10.1.2 National Development Goals: Water, Agriculture and Land Use Planning

The agricultural project pins down key development goals and challenges which were identified as part of the Namibian development goals. It may be considered as an agricultural / irrigation project which aims at generating income from foreign sectors by providing the most value per resource (water, soil and labour). In addition, the project is located in line with the regional planning initiatives which identified the location as an area for irrigation development. The project is considered a long term project.

Developing of the agricultural sector was identified as one of the core plans within the 3rd and 4th National Development Plans for Namibia. The focus on agricultural development has further been carried forward in the 5th National Development Plan which was released during the final quarter of 2017. The agricultural project therefore is considered to be a positive contributor to achieving national development goals.

Project Activity/Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Planning	Project implementation in line with the NDP4 & 5 and regional land use planning.	4	1	2	1	1	16	2	Probable
Daily Operations	Development of the agricultural sector in the Oshikoto Region Project implementation in line with the NDP4 & 5 and regional land use planning.	3	2	2	2	2	36	4	Probable
Indirect Impacts	Contribution to achieving the goals set out in Vision 2030 for Namibia	3	1	3	3	3	36	4	Probable

Desired Outcome: Continued contribution to the development of the Oshikoto Region as well as implementation of project activities in line with the NDP goals and Vision 2030.

Actions

Enhancement:

- Liaison with regional and national governmental agencies through appropriate financial and social responsibility reporting.
- Infrastructure maintenance and development such as, road servitude, water- and sanitation system developments (provision to employees) and node development. Where possible, public and private partnership regarding projects may be considered.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- All project contributions towards regional development, inclusive of communications held with relevant authorities, to be kept on file.

10.1.3 Scientific Knowledge

During the environmental assessment, the social, economic and biophysical information of the area was either updated or augmented by new information. During the assessment biophysical attributes were documented. Similarly information related to water use has been updated and shared with the relevant authorities. The Proponent records borehole data which is submitted to the national authorities on a quarterly basis. Continued information sharing will contribute to the monitoring of the groundwater aquifer. The scientific contribution is of national and international importance.

Project Activity/Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Planning	Updating existing scientific knowledge and contributing new scientific knowledge	4	1	3	3	3	36	4	Definite
Development / Construction	Updating existing scientific knowledge and contributing new scientific knowledge	3	1	3	3	3	27	3	Definite
Indirect Impacts	Increased knowledge about the groundwater aquifer	3	1	1	1	3	15	2	Probable

Desired Outcome: Sharing of all scientific knowledge or finds with relevant authorities and the scientific fraternity.

Actions

Enhancement:

- Monitoring of environmental features of concern, such borehole data, to be conducted and information included in monitoring reports.
- Any heritage, archaeological or paleontological finds to follow chance find procedures which includes the notification of the National Heritage Council.
- Water and soil quality records to be kept on file.
- Weather data records to be kept on file.
- Liaison with regional and national governmental and international agencies regarding matters such as water quality and quantity concerns.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Keeping of all scientific records and finds.
- Proof of data sharing records kept, including proof of water abstraction quantities submitted, proof of environmental monitoring reports submitted.

10.1.4 Skills and Development

During the operations and maintenance / construction phases, some training is provided to a portion of the workforce allow them to conduct certain tasks according to the required standards. Skills are periodically transferred to an unskilled workforce for general tasks. Development of people and technology are key to economic development. The Proponent plays a role in promoting and sustaining the agricultural industry.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Employment and transfer of skills, technological advancements	2	1	2	2	1	10	2	Probable
Daily Operations	Employment and transfer of skills	2	1	3	2	2	14	2	Definite
Indirect Impacts	Employment and transfer of skills in Namibia's agricultural sector	2	1	3	2	3	16	2	Definite

Desired Outcome: To see an increase in skills of local Namibians, as well as development and technological advancements in the agricultural industry.

Actions

Mitigation:

- Sourcing of employees and contractors must first be at local level and if not locally available, regional or national options should be considered. Deviations from this practice must be justified.
- Skills development and improvement programs must be made available as identified during performance assessments.
- Inform employees about parameters and requirements for references upon employment.
- Provide managerial references for unofficial training or skills transfer.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Keep records of all training provided.
- Ensure that all training is certified or managerial references provided (proof provided to the employees) inclusive of training attendance, completion and implementation.
- Include all information in a bi-annual report.

10.1.5 Revenue Generation and Employment

Skilled and unskilled labour are required for the operations and maintenance / construction activities associated with the farm. Livelihoods are thus sustained and the spending power of the local community increased. Revenue is generated through the sale of agricultural products on national and international markets.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Employment and contribution to local and national economy	2	1	2	2	2	12	2	Probable
Daily Operations	Employment contribution to local economy	2	2	3	3	1	28	3	Definite
Indirect Impacts	Decrease in unemployment, contribution to local economy	3	1	3	2	3	24	3	Definite

Desired Outcome: Contribution to national treasury and provision of employment to local Namibians.

Actions

Mitigation:

- The Proponent must employ local Namibians where possible.
- If the skills exist locally, employees must first be sourced from the town, then the region and then nationally.
- Deviations from this practice must be justified.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Bi-annual summary report based on employee records.

10.1.6 Demographic Profile and Community Health

Farming activities rely on labour. The scale of the project is limited and is not foreseen to expand any time soon. No large change in the demographic profile of the local community is thus expected. However, jobseekers migrating to Tsumeb may lead to increased unemployment and expansion of informal settlements. Here, factors such as communicable disease like HIV/AIDS as well as alcoholism/drug abuse may thrive. These are typically aggravated when an influx of seasonal workers, and possible foreign construction teams and contractors, occur. An increase in foreign people in the area, linked to unemployment, may potentially increase the risk of criminal and socially / culturally deviant behaviour. However, the contribution of Neseier, Uitkoms and Baobab to these problems is considered to be unlikely.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	In-migration and social ills related to foreign contractors temporarily on site	2	-1	2	1	2	-10	-2	Probable
Daily Operations	Social ills possibly associated with staff	2	-1	3	2	2	-14	-2	Probable
Indirect Impacts	The spread of disease	2	-1	3	2	2	-14	-2	Improbable

Desired Outcome: To prevent the occurrence of social ills and prevent the spread of diseases such as HIV/AIDS.

Actions:

Prevention:

- Employ only local people from the area, deviations from this practice should be justified.
- Adhere to all local authority by-laws relating to environmental health, which includes, but is not limited to, sanitation requirements.
- Provide educational, awareness information for employees on various topics of social behaviour and HIV/AIDs.
- Disciplinary steps, within the legal parameters of Namibia, to be taken for socially deviant behaviour at the employee-housing compound or during working hours should be clearly stipulated in employment contracts.

Mitigation:

- Take disciplinary action against employees not adhering to contractual agreements with regard to socially deviant behaviour (e.g. alcohol or drug abuse during working hours).

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Summary report based on educational programmes and training conducted.
- Employee contracts on file.
- Bi-annual report and review of employee demographics.

10.1.7 Agricultural Produce and Economic Diversification

The project is in line with Namibia's NDP5 and contributes to the economy of, and food security in, Namibia. Locally produced crops decrease the amount of crops that needs importing. Export to international markets add to a positive trade balance.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Daily Operations	Contribution to economy, contribution to food security in Namibia	3	2	3	2	2	42	4	Definite
Indirect Impacts	Reduced import needs, increase in trade balance. Spread of knowledge and skill, increased crop productivity	3	1	3	2	3	24	3	Definite

Desired Outcome: Maximum contribution to the food security and economy of Namibia. Provide a positive contribution to the trade balance of Namibia by reducing the amount of imported produce and maximising possible exports.

Actions:

Enhancement:

- Train employees on sustainable farming practices to enable the spread of knowledge and skills and thereby increase the productivity of small-scale farming as well.
- Diversification and continuous improvement to maximise sustainability of the farm.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Bi-annual reporting on educational programmes and training conducted.

10.1.8 Traffic

Potential traffic impacts will mostly be limited to the turnoff from the main road to the farm. Traffic is mostly related to the transport of staff, the delivery of fertilizers and seed, as well as the transport of crops to markets. As this is an existing operation, an increase in traffic impacts is expected to be unlikely.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Delivery of equipment and building supplies	2	-1	2	2	1	-10	-2	Improbable
Daily Operations	Increased traffic, road wear and tear and accidents	2	-1	3	2	1	-12	-2	Improbable

Desired Outcome: Minimum impact on traffic and no transport or traffic related incidents.

Actions

Prevention:

- Erect clear signage regarding access and exit points at the farm as well as speed limits on the gravel roads within the farm where required.
- Only licenced drivers who are well trained to be allowed on the national roads.

Mitigation:

- If any traffic impacts are expected, possibly as a result of delivery of equipment or construction material, traffic management should be performed.

- **Responsible Body:**
  - Proponent

Data Sources and Monitoring:

- Record all traffic related complaints and the actions taken to prevent impacts from repeating itself.
- Compile a bi-annual report of all incidents reported, complaints received, and actions taken.

10.1.9 Health, Safety and Security

Activities associated with the operations and maintenance / construction on the farm are reliant on human labour. Therefore, health and safety risks exist. Activities such as the operation of vehicles and machinery as well as handling of hazardous chemicals with inherent health hazards pose risks to employees. Encounters with wild animals and especially venomous species like snakes may pose risks to personnel on site. Security risks relates to unauthorized entry, theft and sabotage.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Physical injuries, exposure to chemicals and criminal activities	1	-2	2	2	1	-10	-2	Probable
Daily Operations	Physical injuries, exposure to chemicals and criminal activities	1	-2	3	2	2	-14	-2	Probable

Desired Outcome: To prevent injury, health impacts and theft.

Actions

Prevention:

- Implement and maintain an integrated health and safety management system, to act as a monitoring and mitigating tool.
- Comply with all health and safety standards as specified in the Labour Act and related legislation.
- Clearly label dangerous and restricted areas as well as dangerous equipment and products.
- Lock away or store all equipment and goods on site in a manner suitable to discourage criminal activities (e.g. theft).
- Provide all employees with required and adequate personal protective equipment (PPE) where required.
- Ensure that all personnel receive adequate training on the operational procedures of equipment and machinery and the handling of hazardous substances.
- Personnel should be encouraged to, during times of mosquito activity, take measures to prevent mosquito bites including wearing long sleeved clothing, applying insect repellents and sleeping under mosquito nets.
- Implement a maintenance register for all relevant equipment and fuel/hazardous substance storage areas.
- Apply and adhere to all industry specific health and safety procedures and regulations applicable to the handling of food produce for markets.

Mitigation:

- Train selected personnel in first aid and ensure first aid kits are available on site. The contact details of all emergency services must be readily available.
- Treat all minor work related injuries immediately and obtain professional medical treatment if required.
- Assess any safety problems and implement corrective action to prevent future occurrences.
- Educate staff on the symptoms of malaria and encourage them to report such symptoms.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Record any incidents with the actions taken to prevent future occurrences.
- Compile a bi-annual report of all incidents reported. The report should contain dates when training was conducted and when safety equipment and structures were inspected and maintained.

10.1.10 Fire

Construction activities, failing electrical infrastructure and fires outside of designated areas may increase the risk of the occurrence of uncontrolled fires which may spread into the nearby fields and surrounding farms. Lightning may cause fires during the dry season.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Fire risk	2	-2	2	2	1	-20	-3	Probable
Daily Operations	Fire risk	2	-2	3	2	1	-24	-3	Probable

Desired Outcome: To prevent property damage, veld fires, possible injury and impacts caused by uncontrolled fires.

Actions:

Prevention:

- Prepare a holistic fire protection and prevention plan. This plan must include evacuation plans and signage, an emergency response plan and a firefighting plan.
- Personnel training (firefighting, fire prevention and responsible housekeeping practices).
- Ensure all chemicals are stored according to MSDS and SANS instructions and all spills / leaks are cleaned.
- Maintain regular site, mechanical and electrical inspections and maintenance.
- Maintain firefighting equipment and promote good housekeeping.
- If necessary, clean and maintain firebreaks at strategic locations around the property.
- Should planned burns e.g. to create firebreaks, be made, the farmers' association, fire brigade as well as all surrounding farmers should be notified prior to commencement.
- Allow fires used for purposes such as cooking (by staff) in designated areas only.

Mitigation:

- Implement the fire protection plan in the event of a fire.
- Quick response time by trained staff will limit the spread and impact of fire.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Maintain a register of all incidents on a daily basis. Include measures taken to ensure that such incidents do not repeat themselves.
- Compile a bi-annual incidents report. The report should also contain dates when fire drills were conducted and when fire equipment was tested and training given.

10.1.11 Noise

Noise is generated through the operation of machinery and vehicles accessing the site. Construction and maintenance activities may increase the amount of noise generating activities which may lead to hearing loss in workers.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Excessive noise generated from construction activities – nuisance and hearing loss	1	-2	2	2	1	-10	-2	Probable
Daily Operations	Noise generated from the operational activities – nuisance and hearing loss	1	-1	3	2	1	-6	-1	Probable

Desired Outcome: To prevent any nuisance and hearing loss due to noise generated.

Actions

Prevention:

- Follow Health and Safety Regulations of the Labour Act and/or World Health Organization (WHO) guidelines on maximum noise levels (Guidelines for Community Noise, 1999) to prevent hearing impairment.
- Service all machinery regularly to ensure minimal noise production.

Mitigation:

- Hearing protectors as standard PPE for workers in situations with elevated noise levels.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Health and Safety Regulations of the Labour Act and WHO Guidelines.
- Maintain a complaints register.
- Bi-annual report on complaints and actions taken to address complaints and prevent future occurrences.

10.1.12 Waste Production

Various waste streams result from the operational and construction / maintenance phases. Waste may include hazardous waste associated with hydrocarbon products and chemicals as well as soil and water contaminated with such products. Construction waste may include building rubble and discarded equipment. Domestic waste will be generated by the farm and related operations. Waste presents a contamination risk and when not removed regularly may become a health and / or fire hazard and attract wild animals and scavengers.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Excessive waste production, littering, illegal dumping, contaminated materials	1	-2	2	2	2	-12	-2	Definite
Daily Operations	Excessive waste production, littering, contaminated materials	1	-2	3	2	2	-14	-2	Definite

Desired Outcome: To reduce the amount of waste produced and prevent pollution and littering.

Actions

Prevention:

- Implement waste reduction measures. All waste that can be re-used / recycled must be kept separate.
- Ensure adequate temporary storage facilities for disposed waste are available.
- Prevent windblown waste from entering the environment.
- Prevent scavenging (human and non-human) of waste at the storage facilities.

Mitigation:

- Waste should be disposed of regularly and at appropriately classified disposal facilities, this includes hazardous material (empty chemical containers and contaminated materials, soil and water).
- Empty chemical containers that may present a contamination / health risk must be disposed of as hazardous waste. Prevent workers and other people from collecting such containers for purposes of storing water.
- Liaise with the applicable authorities regarding waste and handling of hazardous waste.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Maintain a register of hazardous waste disposal. This should include type of waste, volume as well as disposal method/facility.
- Record any complaints received regarding waste with notes on actions taken.
- All information to be included in a bi-annual report.

10.1.13 Ecosystem and Biodiversity Impact

Agriculture and related activities are ongoing at the farm and no expansion is foreseen in the nearby future. No further impacts on vegetation are expected. Pollution of the environment may however impact on the ecosystem and biodiversity. Poaching and illegal collection of plant and animal materials may occur. Irresponsible pesticide use, for example as method of vermin control, may impact on scavengers such as vultures and in the long run on top predators through biomagnification in higher trophic levels.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Impact on fauna and flora. Loss of biodiversity	2	-1	2	2	2	-12	-2	Probable
Daily Operations	Impact on fauna and flora. Loss of biodiversity - poaching	2	-1	3	2	2	-14	-2	Probable

Desired Outcome: To avoid pollution of, and impacts on, the ecological environment.

Actions.

Prevention:

- Obtain the necessary permits from the Directorate of Forestry, Ministry of Agriculture, Water and Forestry for removal of protected tree species, if any.
- Educate all contracted and permanent employees on the value of biodiversity.
- Strict conditions prohibiting harvesting and poaching of fauna and flora should be part of employment contracts.
- Take disciplinary action against any employees failing to comply with contractual conditions related to poaching and the environment.
- Over-abstraction of groundwater may potentially have devastating effects on plant and animal populations reliant on it. This include the drying up of springs, dying of trees and migration or dying of animals.
- Install screens in all new boreholes if existing boreholes are known to extract aquatic animals like amphipods from groundwater. Consider the same for existing boreholes. This will not only prevent entrainment of possibly endemic range restricted species, but also protect pumps from damage.

Mitigation:

- For construction activities, if any, contain construction material to a designated laydown area and prevent unnecessary movement out of areas earmarked for clearing and construction.
- Report any extraordinary animal sightings to the Ministry of Environment and Tourism.
- Mitigation measures related to waste handling and the prevention of groundwater, surface water and soil contamination should limit ecosystem and biodiversity impacts.
- Avoid scavenging of waste by fauna.

Responsible Body:

- Contractor
- Proponent

Data Sources and Monitoring:

- Report on all extraordinary animal or plant sightings or instances of poaching.
- Keep frequent records of borehole water levels and abstracted water volumes to identify any trends or consistent reduction in water levels.
- Compile a bi-annual report on all monitoring results.

10.1.14 Groundwater, Surface Water and Soil Contamination

Leakages and spillages hazardous substances from vehicles and accidental fuel, oil or hydraulic fluid spills. Increase of nutrient levels (from over application of fertilizers) in the soil that can leach to the groundwater. Overuse / incorrect application of pesticides, herbicides and fertilisers may also pose a risk.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2)Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Hazardous material, spillages, hydrocarbon leakages from vehicles and machinery.	2	-1	2	2	1	-10	-2	Improbable
Daily Operations	Hazardous material, spillages, hydrocarbon leakages from vehicles and machinery. Over application of fertilizer, pesticides, herbicides, etc. Sewerage system malfunction.	2	-1	3	2	1	-12	-2	Probable

Desired Outcome: To prevent the contamination of groundwater, surface water and soil.

Actions

Prevention:

- Appoint reputable contractors.
- Service vehicles on a suitable spill control structure at all times.
- Regular inspections and maintenance of all vehicles to ensure no leaks are present.
- All hazardous chemicals should be stored in a sufficiently bunded area.
- Follow prescribed dosage of fertilizers, pesticides and herbicides to prevent over application.
- Maintain sewerage systems.
- Removed and dispose all hazardous waste of timeously and at a recognised hazardous waste disposal facility, including any polluted soil or water.

Mitigation:

- Immediately clean any spill that occurs.
- Consult relevant Material Safety Data Sheet information and a suitably qualified specialist where needed.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Material Safety Data Sheets for hazardous chemicals.
- Soil should be sampled and analysed annually to ensure the correct amounts of fertilizer is applied and soil and groundwater quality are maintained.
- Sample and analyse groundwater annually to test for nitrate concentrations from the fertilizers and for traces of chemicals used in pesticides and herbicides.
- Keep registers on the type, quantities and frequency of application of fertiliser, pesticides and any other chemicals utilised in crop production.
- Maintained a register of all incidents on a daily basis. This should include measures taken to ensure that such incidents do not repeat themselves.
- Reported on and cleaned up all spills or leaks immediately.

10.1.15 Groundwater Availability (Abstraction)

Groundwater abstraction is a very sensitive topic in a dry country where the value of land is drastically reduced if no or unusable groundwater is present on the land. Abstraction of groundwater must be done in a sensible way not to impact on other groundwater users that depend on such groundwater. This includes water abstracted for human and animal use, irrigation, and also ecosystems that depend on groundwater. A typical groundwater balance was compiled to illustrate the potential consequences of over abstraction of groundwater, see Figure 9-1. Recharge to the area is considered to be high.

In a typical groundwater environment, a water balance would consist of inflow and outflow of the groundwater system. Over time an equilibrium (or steady state) is normally reached with rising water tables following good recharge events and declining water tables when recharge is below average. Inflow into the system would typically be from infiltration following rainfall in the area and in upstream areas. Outflow would be comprised of water leaving the system through springs and as outflow over the lower boundary of the groundwater system as well as evapotranspiration losses. Groundwater abstraction through boreholes is important as this is normally necessary to sustain human and animal demands where such users became essentially dependant on the abstracted groundwater as a reliable and sustainable source.

Typical consequences of over abstraction will include a lowering in the water table. This may further lead to the drying up of boreholes, springs, and shallow wells. Vegetation will also be impacted where such vegetation has access to groundwater.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2)Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Daily Operations	Over-abstraction of the local aquifer, decrease in the local hydraulic head.	2	-2	3	2	2	-28	-3	Probable

Desired Outcome: To utilise the groundwater sustainably.

Actions

Prevention:

- Spread the water abstraction points over a larger area to diffuse the impact.
- Borehole EB8 is proposed as a monitoring borehole. Water levels here must be allowed to fully recover before a water level reading is taken.
- Maintain safe abstraction rates prescribed by MAWF in the abstraction permit.

Mitigation:

- Reduce abstraction when the water levels decrease with more than 5 m below the long-term average.
- Reduce water consumption when levels decrease by 5 m below the long term average and optimise water usage and prevent water losses.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Monthly water rest water level monitoring.
- Review baseline water level values every three years based on all historic water level data collected.
- A summary report on all monitoring results must be prepared.
- The Proponent must supply monitoring returns to the MAWLR, as required by the permit.

10.1.16 Visual Impact

This impact relates to the aesthetic appearance of the site during operations. This impact will be minimal due to the area already being disturbed and widely utilised for agricultural activities. The impact will therefore mostly relate to poor housekeeping and waste not disposed of timeously. Operations at the farm are well kept with the highest standard of neatness and cleanliness exhibited throughout all components of the operations, inclusive of employee housing.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	Aesthetic appearance and integrity of the site	1	-1	2	2	2	-6	-1	Probable
Daily Operations	Aesthetic appearance and integrity of the site	1	-1	3	2	2	-7	-1	Probable

Desired Outcome: To minimise aesthetic impacts associated with the farm.

Actions

Mitigation:

- Regular waste disposal, good housekeeping and routine maintenance on infrastructure will ensure that the longevity of structures are maximised and maintain a low visual impact.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Compile a bi-annual report of all complaints received and actions taken.

10.1.17 Impacts on Utilities and Infrastructure

Existing infrastructure and services supply like roads, pipelines and power lines may get damaged during operational, construction and maintenance activities. This may lead to services disruption in certain sections of the area.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction Phase	Disruption of services and damage to infrastructure	2	-1	2	2	1	-10	-2	Improbable
Daily Operations	Disruption of services and damage to infrastructure	2	-1	3	2	1	-12	-2	Improbable

Desired Outcome: No impact on utilities and infrastructure.

Actions

Prevention:

- Appointing qualified and reputable contractors and employees (for specific tasks) are essential.
- Determine exactly where amenities and pipelines are situated before construction commences (utility clearance e.g. ground penetrating radar surveys).
- Liaison with the suppliers of services is essential.

Mitigation:

- Report any damages without any delay.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Emergency procedures for corrective action available on file.
- Compile a bi-annual report on all incidents that occurred and corrective action taken.

10.1.18 Cumulative Impact

Possible negative cumulative impacts (i.e. the build-up of minor impacts to become more significant) associated with the operational phase and any maintenance/construction activities are mainly linked to traffic, reduction in soil and groundwater quality and groundwater availability. The cumulative increase in employees in the area may put more pressure on biodiversity as a result of poaching or harvesting of plant and animal products. The cumulative positive impacts from farming in the Otjozondjupa Region relates to increased and sustained employment, revenue generation and overall improved living conditions and livelihoods as a result of increased spending power.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction	The build-up of minor impacts to become more significant	2	-1	2	2	1	-10	-2	Improbable
Daily Operations	The build-up of minor impacts to become more significant	2	-1	3	2	1	-12	-2	Probable

Desired Outcome: To minimise cumulative all impacts associated with the farm.

Actions

Mitigation:

- Addressing each of the individual impacts as discussed and recommended in the EMP would reduce the cumulative impact.

- **Responsible Body:**
  - Proponent

Data Sources and Monitoring:

- Reviewing bi-annual reports for any new or re-occurring impacts or problems would aid in identifying cumulative impacts. Planning and improvement of the existing mitigation measures can then be implemented.

10.2 DECOMMISSIONING AND REHABILITATION

Closure and decommissioning of agricultural activities on Neseier, Uitkoms and Baobab as a whole is not foreseen during the validity of the environmental clearance certificate or in the foreseeable future. However, it is more likely that certain components may be decommissioned. Decommissioning is therefore included for this purpose as well as the fact that construction activities may also include modification and decommissioning. Prior to decommissioning, assess the future land use plans and implement rehabilitation measures if the land will not be used for similar future purposes. Decommissioning will entail the complete removal of all infrastructure including buildings and underground infrastructure. Any pollution present on the site must be remediated. The impacts associated with this phase include noise and waste production during structure dismantling. Maintain noise levels within Labour Act and/or WHO standards and contain waste and dispose of it at an appropriately classified and approved waste facility. The Environmental Management Plan for the farm will have to be reviewed at the time of full decommissioning to cater for changes made to the site and to implement guidelines and mitigation measures.

10.3 ENVIRONMENTAL MANAGEMENT SYSTEM

The Proponent could implement an Environmental Management System (EMS) for their operations. An EMS is an internationally recognized and certified management system that will ensure ongoing incorporation of environmental constraints. At the heart of an EMS is the concept of continual improvement of environmental performance with resulting increases in operational efficiency, financial savings and reduction in environmental, health and safety risks. An effective EMS would need to include the following elements:

- A stated environmental policy which sets the desired level of environmental performance;
- An environmental legal register;
- An institutional structure which sets out the responsibility, authority, lines of communication and resources needed to implement the EMS;
- Identification of environmental, safety and health training needs;
- An environmental program(s) stipulating environmental objectives and targets to be met, and work instructions and controls to be applied in order to achieve compliance with the environmental policy; and
- Periodic (internal and external) audits and reviews of environmental performance and the effectiveness of the EMS.
- The EMP

11 CONCLUSION

Agricultural activities on Neseier, Uitkoms and Baobab contributes positively to the agricultural sector of Namibia. Food is produced for national and international markets. It provides employment opportunities and skills development to a local workforce. Revenue is generated that contributes to the Namibian economy.

Negative impacts associated with the operations and maintenance / construction activities can successfully be mitigated. Implementing a safety, health, environment and quality (SHEQ) policy will contribute to effective management procedures to prevent and mitigate impacts. All regulations related to agriculture and health and safety legislation should be implemented. Groundwater and soil pollution must be prevented at all times. Fire prevention is important, fire response plans must be in place, and regular training provided. All staff must be made aware of the importance of biodiversity and the poaching or illegal harvesting of animal and plant products prohibited. Waste must be discarded appropriately. Certain wastes can be re-used or recycled where possible. Hazardous waste must be disposed of at an approved hazardous waste disposal site.

Based on current water level fluctuations in the area, a short term threshold of 5 m below the long term average rest water level is set from where abstraction rates should be reduced. This threshold may require adjustment during drought periods as abstraction from neighbouring farms may also influence the regional water levels. Careful cooperation between neighbouring farms and beyond is required to

optimally utilize the groundwater resource without depleting it, as depletion will be detrimental to all. This should include self-monitoring and assessment of water levels in the area as monitoring data obtained from DWA indicates a lack of sufficient monitoring by DWA in the recent years. Proper monitoring data will provide the required information to make informed decisions and will assist to obtain increased abstraction volume permits when needed and if justified. Care must be exercised when long term irrigation takes place on unsuitable soil as soil deterioration may take place. Soil suitability should therefore be assessed.

The EMP (Section 10) should be used as an on-site reference document for the operations of the farm. Parties responsible for transgression of the EMP should be held responsible for any rehabilitation that may need to be undertaken. The Proponent could use an in-house Health, Safety, Security and EMS in conjunction with the environmental management plan. All operational personnel must be taught the contents of these documents.

Should the Directorate of Environmental Affairs (DEA) agrees with the impacts and related mitigation measures; they may issue an environmental clearance certificate to the Proponent. The environmental clearance certificate will render this document legally binding on the Proponent. The Proponent must focus on Section 10, which includes the EMP, for continued execution of their activities. The assessment process's aim is not to stop the activity, or any of its components, but to rather determine its impact and guide sustainable and responsible development as per the spirit of the EMA.

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Appendix A: Certificates

T.I.F.A.

TRAINING IN FIRST AID

Certificate of Completion

In terms of Regulations 218, 234 and Annexure G of the Regulations relating to the Health and Safety of Employees at Work made

Under the Labour Act 1992 (act 6 of 1992)amended by labour act 2007(Act.11 of2007)

is hereby granted to:
DANIEL SORASEB

830423 1041 8

to certify that he/she has completed the prescribe course of lectures and demonstrations and has passed the examination:

LEVEL ONE

QUALIFICATION GRANTED

VALID FOR THREE YEARS FROM DATE OF ISSUE

H. Jaljaard
Instructor

No: F.A.07/2016 A.I.A 18/17

Date:27/06/2020

Certificate of Attendance

This is to certify that:

Titus Tjnoseb

Name

861223 00442

ID

Attended The:

Responsible use of Plant Protecting products course

Tsumeb

Held at

19 July 2022

on

Bustian Richards

Agri/C PROV/0510/14 (CROPLIFE)

Presented by

Signed:

Agri-gro Namibia
Together we make it grow

7 Hosea Kutako Dr, Windhoek
061-253-322
info@agrigronamibia.com

REPUBLIC OF NAMIBIA

MINISTRY OF AGRICULTURE, WATER AND RURAL DEVELOPMENT

Tel: +264 67 22 1176/7;
+264 67 22 0263
Fax: +264 67 220323
E-mail: Lukas.Kaholongo@mawf.gov.na

Department of Agriculture
Directorate of Agricultural Production, Ext. & Eng. Services
North Central Division
Oshikoto Region Sub-Division
Tsumeb ADC
P.O. Box 272
Tsumeb

RE: RECEIPT OF EMPTY CHEMICAL CONTAINERS

This is to certify that I, DJ van der Berg
Farm Noesier number, P. O. Box 571
Cell/telephone number 0811477800., brought the following number of empty containers:

Number of containers: 4x 25L 18x 5L

Signature: Date: 07/09/2022

Received by: Raimo Kalyangula

Signature: Date: 07/09/2022

REPUBLIC OF NAMIBIA
MINISTRY OF AGRICULTURE, WATER AND FORESTRY
07 SEP 2022
TSUMEB SUB BASIN MANAGEMENT COMMITTEE

Appendix B: Hydrogeological Specialist Study

AGRICULTURAL ACTIVITIES ON FARMS NESEIER, UITKOMS AND BAOBAB - OSHIKOTO REGION

HYDROGEOLOGICAL SPECIALIST STUDY

Assessed by:

Assessed for:

D J van der Berg

March 2023

Project:	**AGRICULTURAL ACTIVITIES ON FARMS NESEIER, UITKOMS AND BAOBAB: HYDROGEOLOGICAL SPECIALIST STUDY**	
Report Version/Date	V1 March 2023	
Prepared for	D J van der Berg P.O. Box 571 Tsumeb Namibia	
Lead Consultant	Geo Pollution Technologies (Pty) Ltd PO Box 11073 Windhoek Namibia	TEL.: (+264-61) 257411 FAX.: (+264) 88626368
Main Project Team	**Pierre Botha (Leader)** (B.Sc. Geology/Geography); (B.Sc. (Hons) Hydrology/Hydrogeology)	
Cite this document as:	Botha P; March 203; Agricultural activities on farms Neseier, Uitkoms and Baobab: Hydrogeological Specialist Study	
Copyright	Copyright on this document is reserved. No part of this document may be utilised without the written permission of Geo Pollution Technologies (Pty) Ltd.	
Report Approval	 Pierre Botha Managing Director	

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1 INTRODUCTION

D J van der Berg (the Proponent) appointed Geo Pollution Technologies (Pty) Ltd to undertake a hydrogeological specialist study for the agricultural activities on Farms Neseier, Uitkoms and Baobab, all being portions of Farm Ludwigshafen No. 480 (Figure 1-1). The proponent currently irrigates 144 ha for the production of mainly citrus, carrots, maize, sorghum, radishes and onions. Irrigation is from five production boreholes, by means of mainly centre pivot, micro-sprayer and sprinkler irrigation systems.

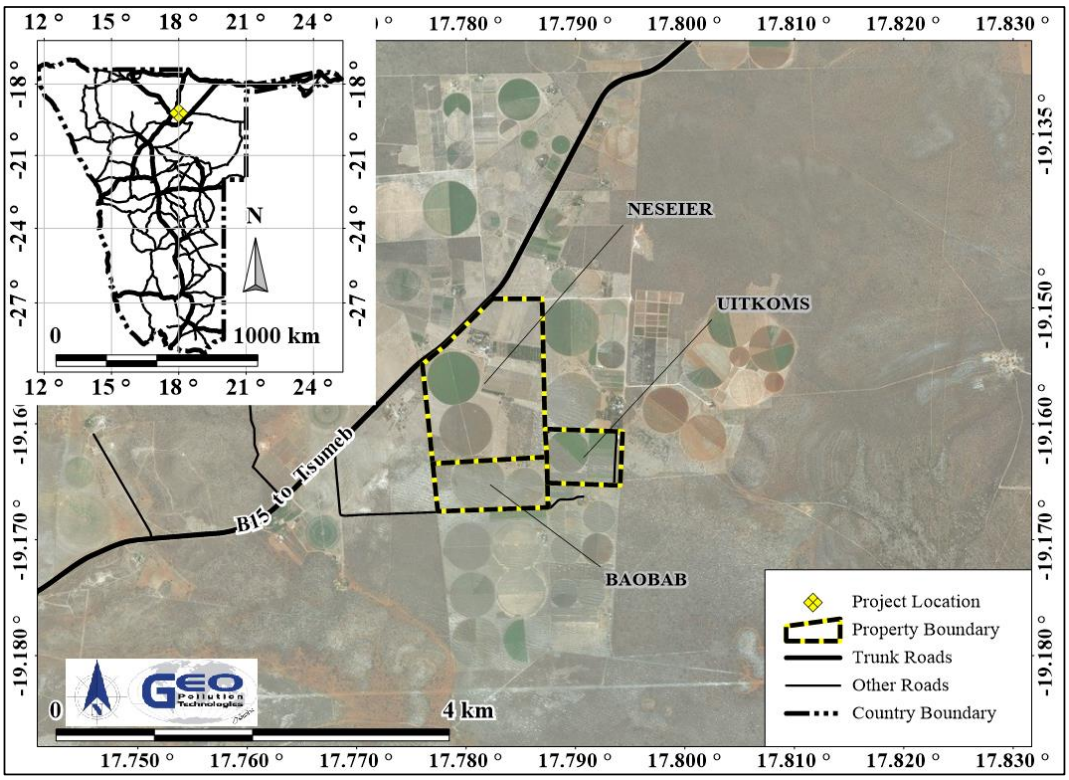


Figure 1-1 Project location

2 SCOPE OF WORK

The aims of the study were to:

1. Conduct a hydrogeological assessment based on data obtained from an in-field hydrocensus survey.
2. Gather historic information and compile a hydrogeological assessment based on the information.

3 METHODOLOGY

Obtain and review all available geological and hydrogeological information/reports for the investigation area. Review and delineation of hydrogeological catchment and sub-catchments within the investigation area. This will be based on historic groundwater level data contained in the Department of Water Affairs (DWA) database and from hydrocensus data done on behalf of the proponent. Prepare a specialist report of the investigation.

4 ADMINISTRATIVE, LEGAL AND POLICY REQUIREMENTS

To protect the environment and achieve sustainable development, all projects, plans, programmes and policies deemed to have adverse impacts on the environment require an environmental impact assessment (EIA), as per the Namibian legislation. The key legislation provided in Table 4-1 govern the environmental assessment process in Namibia and/or are relevant to the project.

Table 4-1. Namibian Law applicable to the project

Law	Key Aspects
The Namibian Constitution	♦ Incorporate a high level of environmental protection. ♦ Land, water and natural resources below and above the surface of the land and in the continental shelf and within the territorial waters and the exclusive economic zone of Namibia shall belong to the State if they are not otherwise lawfully owned.
Environmental Management Act Act No. 7 of 2007, Government Notice No. 232 of 2007	♦ Defines the environment. ♦ Promote sustainable management of the environment and the use of natural resources.
The Water Act Act No. 54 of 1956	♦ Defines the interests of the state in protecting water resources. ♦ Defines and prohibits pollution of water sources. ♦ Controls the disposal of effluent. ♦ Whenever an owner of land obtains, by artificial means on his own land, a supply of water which is not derived from a public stream, such water shall be deemed to be private water. ♦ Remains in force until the new Water Resources Management Act comes into force.
Water Resources Management Act Act No. 11 of 2013	♦ Provide for management, protection, development, use and conservation of water resources. ♦ Prevention of water pollution and assignment of liability. ♦ Not in force yet.
Soil Conservation Act Act No. 76 of 1969	♦ Law relating to the combating and prevention of soil erosion, the conservation, improvement and manner of use of the soil and vegetation and the protection of the water sources Namibia.

Relevant water resource development and related activities listed as activities requiring an environmental clearance certificate are (Government Notice No. 29 of 2012):

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

8.2 The abstraction of groundwater at a volume exceeding the threshold authorised in terms of a law relating to water resources.

8.6 Construction of industrial and domestic wastewater treatment plants and related pipeline systems.

8.7 Irrigation schemes for agriculture excluding domestic irrigation.

8.8 Construction and other activities in water courses within flood lines.

8.9 Construction and other activities within a catchment area.

The relevance of 8.2 is not clear as to under which act such a threshold is defined, if any. The Water Resources Management Act (Act No. 11 of 2013) is likely to define such a threshold and it is expected to incorporate more of Namibia into water control areas in which abstraction permits would be required. The current Water Act (Act No. 54 of 1956) only requires abstraction permits within water control areas, see Figure 5-5. Abstraction permits are currently issued by the Ministry of Agriculture Water and Land Reform (MAWLR). The project falls inside a control area, thus an abstraction permit is a requirement.

Within the Water Act (Act No. 54 of 1956) it is clearly stipulated that the purification and disposal of industrial water and effluents as well as the disposal of effluents by local authorities is subjected to the requirements of the Act. Agricultural activities is not subjected to the requirements of the Act, making the implementation of 8.6 questionable. The return period for flood lines is not provided for, nor a definition of flood lines to make 8.8 applicable. It is however in the Proponent's best interest to ensure

that the project area is outside a flood risk area. All land in Namibia is in some form of catchment area, making the practical implementation of 8.9 questionable. It however remains important to consider all activities that would/may impact on the groundwater.

5 DESCRIPTION OF NATURAL ENVIRONMENT

5.1 HYDROGEOLOGICAL LOCATION

Farms Neseier, Baobab and Uitkoms (19.15350 °S; 17.78130 °E) are located within the Owambo Groundwater Basin (Figure 5-5). The project area is within the Tsumeb-Otavi-Grootfontein Subterranean Water Control Area, as declared in Government Notice 1969 of 13 November 1970 and Proclamation 278 of 31 December 1976 (Extension).

Implications and Impacts

Groundwater Basin committees will likely be formed under the Water Resources Management Act, Act No. 11 of 2013, after it comes into force. This will likely give more powers to groundwater users in a basin to ensure sustainability of groundwater usage, but also encourage the optimal usage of groundwater. The project area falls inside a declared water control area and permits are required for drilling and rehabilitation of boreholes as well as for groundwater abstraction.

5.2 CLIMATE

The general lack of functioning weather stations in Namibia, in especially rural areas, limits the availability of long term, true weather data. As a best possible workaround, long term climate data was obtained from the Atlas of Namibia Project (2002) and the CHIRPS-2 database (Funk et al., 2015), see Table 5-1 and Figure 5-1.

The CHIRPS-2 dataset (Climate Hazards Group Infra-Red Precipitation with Station data version 2) consist of long term precipitation data (1981 to near-present) obtained from satellite imagery and in situ station data. The resultant dataset provides a reasonably well represented overview of the precipitation conditions of a general area. True values for single, site specific meteorological events may however differ to some degree. Precipitation in the area is mostly in the form of rainfall.

According to the Köppen-Geiger Climate Classification system the project is located in a hot semi-arid climate (BSh). Average rainfall received is 450-500 mm/a with a variation of < 30 %. Monthly rainfall peaks in January. The potential evapotranspiration is 2400 - 2500 mm/a. By dividing the mean annual potential evapotranspiration into the mean annual precipitation, an aridity index value for the area was computed as 0.2, which indicates the area to be Semi-Arid. This means that the area receives precipitation below potential evapotranspiration, but not as low as a desert climate and has a mean annual temperature of at least 18 °C. The average annual minimum temperature is 6-8 °C, while the average annual maximum temperature is 32-34 °C, with an average annual temperature range of 26-28 °C. An average diurnal temperature (difference between daily minimum and maximum temperature) for this area is around 16-18 °C. Direct normal solar irradiance for the area is 6.674 kWh/m^2/day. (Atlas of Namibia Team, 2022).

The rain season normally starts in October and last until April, peaking in January and February. Heavier rainfall (single day events) occur between November and April, with a single event of 50.3 mm in January (last 40 years data) being the highest (Table 5-1). Most of the single day maximums are less than 50 mm. This value is probably less than in reality as the area receives heavy rainfall from thunderstorm cells, which are normally smaller than the 5 X 5 km grid sizes of the CHIRPS data.

The average annual evaporation rate remains high at up to 3,000 mm/a. The average annual precipitation for the last 40 years was calculated as 442 mm/a, with a coefficient of variance of 25% (Table 5-1). Daily and seasonal precipitation data (Funk et al., 2015) is presented in Figure 5-1. Seasonal (July to June) total precipitation, centred on the average line for the last

40 years, is presented, with the daily total precipitation and the seasonal cumulative precipitation. From the figure it is clear that six out of the last ten seasons were much drier than usual.

Table 5-1 Rainfall statistics (Funk et al, 2022)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum (mm/m)	10.46	31.22	20.88	6.42	0.00	0.00	0.00	0.00	0.00	5.38	8.75	20.50
Maximum (mm/m)	248.52	167.54	137.39	102.36	2.10	0.72	0.04	0.02	3.69	55.58	99.29	157.08
Average (mm/m)	98.0	96.8	70.8	26.7	0.1	0.0	0.0	0.0	0.3	18.8	42.4	77.3
Variability (%)	59.0	44.0	43.0	82.0	377.0	367.0	452.0	624.0	256.0	71.0	49.0	47.0
Daily maximum (mm)	50.3	37.2	50.0	38.5	2.1	0.5	0.0	0.0	2.9	25.7	28.9	43.6
Average rain days	14	12	8	3	0	0	0	0	0	3	7	11
Season July - June average: 442 mm					Season coefficient of variation: 25 %							
Data range	1981-Jul-01		to		2022-Jun-30					Lat: 19.1535°S Long: 17.7813°E		

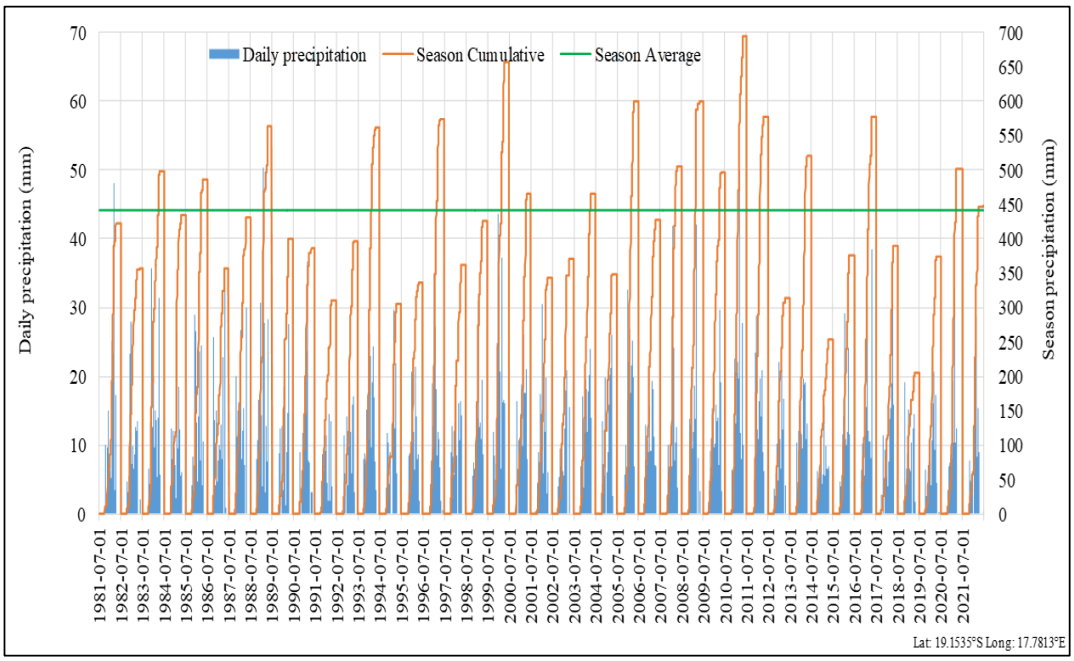


Figure 5-1 Daily and seasonal precipitation (Funk et al., 2015)

Implications and Impacts

Water is a scarce and valuable resource in Namibia and the extreme variability in seasonal rainfall makes water an extremely vulnerable resource. Rainfall events are typically thunderstorms with heavy rainfall that can occur in short periods of time (cloud bursts). Pollutants that enter the groundwater can pollute this valuable resource. Rainfall is important for groundwater recharge.

5.3 TOPOGRAPHY & DRAINAGE

The project area farms are located on the northern edge of the Karstveld Landscape where the landscape changes into the Kalahari sandveld with palaeo dunes and pans. Some Kalahari surface deposits in the form of pan deposits are present. The farms are on a level area on the northern edge of the Otavi Mountain Land, which is dominated by hills rising up to 500 m above the surrounding plains.

Drainage is poorly developed in the area. The site is located within the catchment of the Etosha Pan. The development of sinkholes, dolines and caves are common in the area. The slope of the farm area is less than 5°, see Figure 5-2.

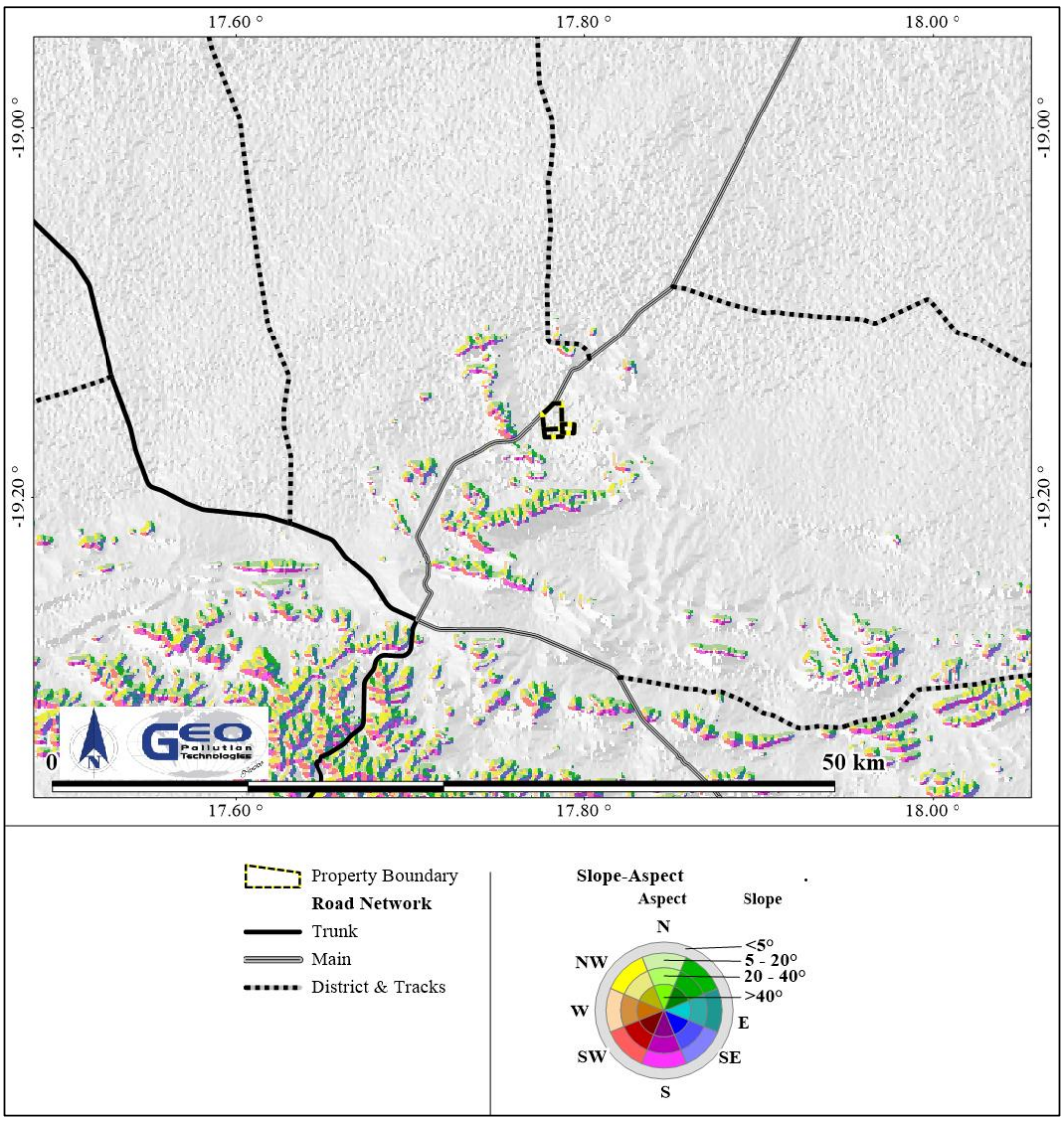


Figure 5-2 Aspect slope and surface drainage

Implications and Impacts

The lack of major surface runoff and drainage may lead to pooling and even flooding of plains during heavy rainfall events. This may negatively impact soil quality and cause localised flooding of infrastructure, if located in flood prone areas, or if such areas are not considered in designs. The risk of erosion is relatively low.

5.4 SOIL

The project area farms soil type are dominantly Haplic Calcisol, which refers to undifferentiated soils with high lime concentrations in the subsoil and with the soil having the typical expression of the Soil Reference Group in the sense that there is no further or meaningful characterization. The composition of soil in this particular area is roughly 65-70 % sand, 10-15 % silt and 15-20 % clay which gives it the characteristics and texture of silty clay loam soil. Bulk density was computed to be 1,400-1,450 mg/cm³. Soils in this area typically reach depths of >190 cm.

The farms fall entirely within the Kalk-2 agro-ecological zone (AEZ) Kalk-2 is described as Kalkveld, having a median growing period of 91-90120 days, a dependable growing period of 80% of the average. This AEZ is ranked 2nd in Namibia in terms of agricultural potential and is deemed most suitable for short-maturing crops and / or large stock grazing. The Kalk-2 area is generally not regarded as suitable for cropping and this is true for the largest part. The areas under irrigation around Tsumeb are however located in patches where sufficiently deep, quality soil is present for irrigation of crops. On Neseier, Uitkoms and Baobab it is mainly the southern portion where cropping is practised in suitable soils. The availability of groundwater and suitable soils do allow for crop cultivation.

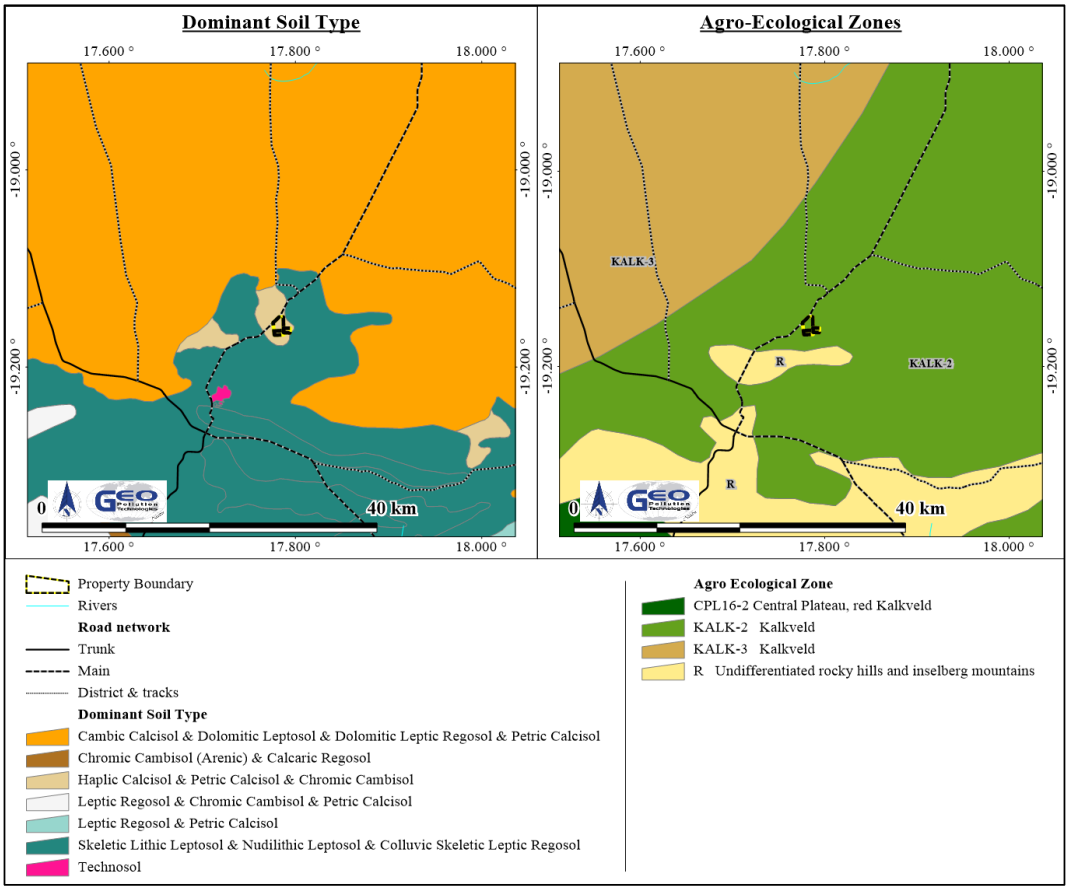


Figure 5-3 Dominant soil type and agro ecological zone

Implications and Impacts

Soil is considered to be shallow with boulders being common. This makes ploughing difficult. The clay content is locally high as well as the organic content. The high clay content will reduce the infiltration rate during saturated condition but cracks in the topsoil during unsaturated conditions will form preferred infiltration pathways with high infiltration rates.

Soil seems to be suitable for irrigation.

5.5 GEOLOGY AND HYDROGEOLOGY

The geology underlying the project area farms formed during the Quaternary and Tertiary Age. Locally the geology from the Quaternary and Tertiary Age comprises of the Kalahari Group deposits which consists of sand, calcrete and gravel. The Kalahari Group sediments originate mainly from fluvial deposition with some reworking through aeolian processes. Kalahari sediments at the project location form only a surface cover. The Kalahari Group sediments

commonly overlie pre-Kalahari rocks, in this case dolostones belonging to the Elandshoek Formation of the Tsumeb Subgroup, that forms part of the Otavi Group in the Damara Sequence of Namibian Age (Schneider, 2004).

Moderate folding of the strata occurred during the Pan African Orogeny (680-450 Ma) and resulted in the formation of synclines and anticlines, generally trending east - west or north - south. The development of joints and fractures in the rocks are associated with the folding, which have an impact on the hydrogeological characterization of the area. A synclinal structure with fold limbs dipping roughly toward the north and south occur in the eastern part of the project farm. See Figure 5-4 for the hydrogeology map of the area.

The main fault orientation is roughly northeast to southwest and northwest to southeast. Geophysical-interpreted dykes occur in the area and strike towards the northeast. Figure 5-4 depicts geological structures interpreted from geophysical data for these farms and surrounding area. The Tsumeb dyke is located along the northwestern border of the farm. The nature of the dykes tend to be a mineralised fault with high hydraulic conductivity values. The Tsumeb dyke represented a major exploration target for the NamWater exploration water supply programme to Windhoek. The dykes are thought to have shattered the host rocks during its formation (Hoad, 1992). Where dolomite is the host rock, it forms a zone favourable for the development of karst features and groundwater accumulation.

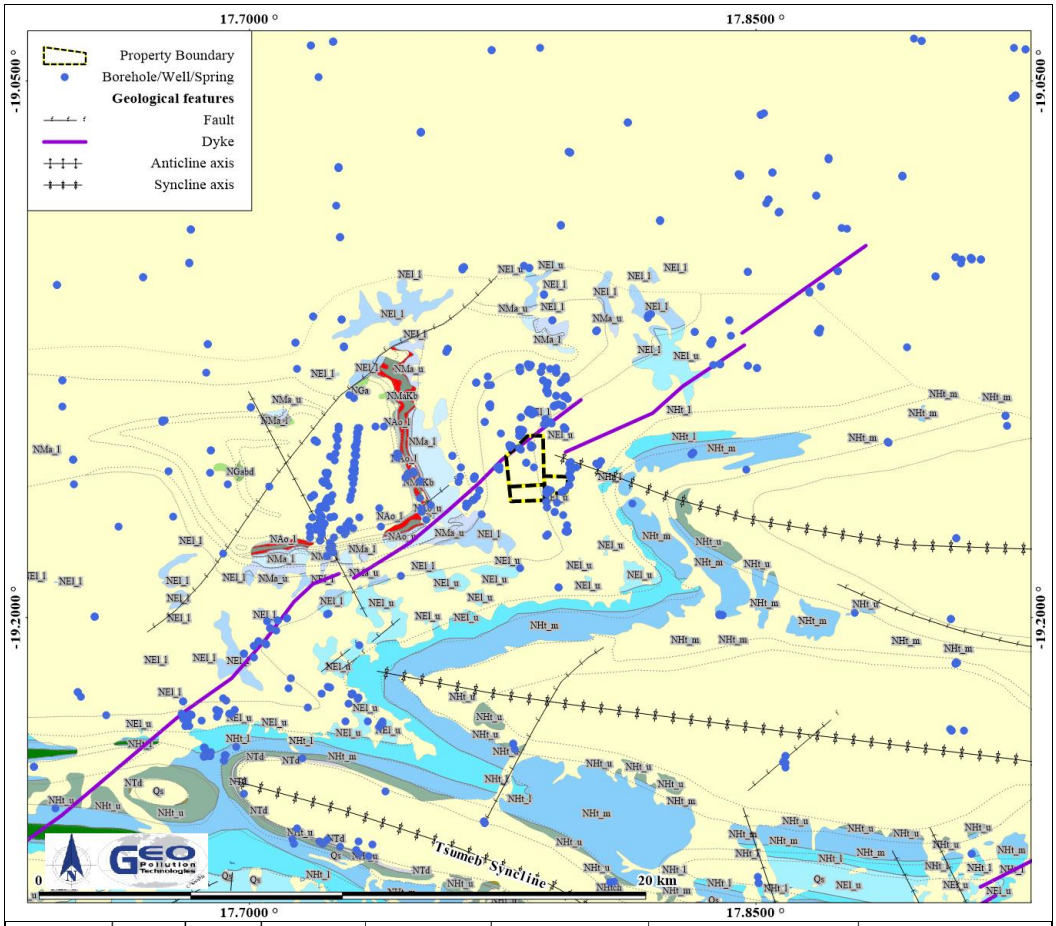
The Tsumeb Mine is also located approximately 11 km to the southwest of the project area farms. This hydrothermal deposit represents a highly mineralized zone of which metals like lead, copper and zinc were mined until 1996 when the mine was flooded and subsequently closed (Grünert, 2000).

A number of springs are present in the Otavi Mountain land and most of these springs are related to the contact zones between relatively impermeable formations and more permeable formations. The nearest of these contact zone springs is present approximately 38 km to the southeast of the project farms (Figure 5-7). The only nearby spring present within the area covered by Kalahari sediments is present on the farm La Rochelle, 22 km northeast of the project area. No caves or lakes are known of near (<10 km radius) the project area.

The project location is situated in the Owambo Groundwater Basin. Localised groundwater flow may take place along preferred flow paths in different directions, but the larger scale groundwater flow is expected to be in a northern direction (Figure 5-5). Local flow patterns may vary due to groundwater abstraction. Groundwater flow is expected to take place through primary porosity in the surface cover, while it is expected to flow along fractures, faults, dykes/mineralised faults or along contact zones (secondary porosity) and other geological structures present within the underlying formations (hard rock formations). Contact zones in the area occur between bedded and massive dolostone and creates favourable conditions to promote groundwater flow.

Groundwater quality data is presented in Figure 5-6 as Maucha plots. From the figure it is clear that the groundwater of the project location is mostly of a calcium-magnesium-bicarbonate type water which suggest the water is recently recharged. Groundwater quality from the project area reflect an aquifer that is typical of a dolomitic hard rock formation host where rapid groundwater recharge takes place.

Groundwater statistics of 53 boreholes in a 5 km radius suggest that the water quality is generally good (Table 5-2) with some elevated nitrate concentrations observed in approximately 25% of the data. Boreholes were mostly drilled less than 49 m deep. The groundwater information was obtained from Department of Water Affairs (DWA) borehole database and from the proponent. The DWA database is generally outdated and more boreholes might be present. Some boreholes might also be abandoned and not utilised.



Age	Lithcode	Sequence	Group	Subgroup	Formation	Rocktypes	Remarks
Quaternary	Qs					sand, gravel, calcrete	
Namibian	NTd	Damara	Mulden		Tschudi	quartzite;greywacke;arkose	
	NMD					phyllite	sandstone; greywacke; conglomerate
	NHt		Otavi	Tsumeb	Huttenberg	dolostone	limestone; chert; shale
	NHt_l					dolostone (bedded)	chert (algal)
	NHt_m					dolostone (bedded)	phyllite
	NHt_u					dolostone (bedded)	
	NHtl					limestone	shale
	NEl				Elandshoek	dolostone	
	NEl_l					dolostone (massive)	
	NEl_u					dolostone (bedded)	
	NElch					chert	
	NMa_u				Maieberg	dolostone (bedded)	
	NMa_l					limestone/marl (bedded)	
	NMa					limestone; dolostone	
	NTM					dolostone; limestone	chert
	NGh		Swakop/ Otavi	Usakos/ Abenab	Ghaub	diamictite	
	NCh				Chuos	diamictite; pebbly schist	quartzite; conglomerate; dolostone; shale
	NBa		Otavi	Abenab	Auros	limestone; dolostone	shale
	NEl				Gauss	dolostone (massive)	
	NAo				Berg Aukas	dolostone (laminated; light/dark)	
	NAB					dolostone	limestone; shale
	NOT					dolostone; limestone	chert;sandstone (calcareous) grit (dolomitic)
	Nkb		Swakop	Khomas	Karibib	Marble, schist, ortho-amphibolite, quartzite	
	NNb		Nosib		Nabis	quartzite; arkose	conglomerate; shale
Mokolian	Mhu					Para-/orthogneiss, metasedimentary rocks, granite, metabasite dykes	

Figure 5-4 Hydrogeological map

Table 5-2 Groundwater statistics

Query Centre:	Plot Neseier; -19.1535°S; 17.7813°E										Query Box Radius: 5.0km
	NUMBER OF KNOWN BOREHOLES	LATITUDE	LONGITUDE	DEPTH (mbs)	YIELD (m3/h)	WATER LEVEL (mbs)	WATER STRIKE (mbs)	TDS (ppm)	SULPHATE (ppm)	NITRATE (ppm)	FLUORIDE (ppm)
Data points	53			9	7	10	4	4	4	4	4
Minimum		-19.108504	17.733667	5	4	2	10	357	4	0	0
Average				32	20	15	21	678	99	13	1
Maximum		-19.198496	17.828933	49	72	27	35	1272	305	44	1
Group A				100.00%	57.14%	30.00%	25.00%	75.00%	75.00%	75.00%	100.00%
Limit				50	>10	10	10	1000	200	10	1.5
Group B				0.00%	28.57%	70.00%	75.00%	25.00%	25.00%	0.00%	0.00%
Limit				100	>5	50	50	1500	600	20	2.0
Group C				0.00%	14.29%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Limit				200	>0.5	100	100	2000	1200	40	3.0
Group D				0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	25.00%	0.00%
Limit				>200	<0.5	>100	>100	>2000	>1200	>40	>3

Statistical grouping of parameters is for ease of interpretation, except for the grouping used for sulphate, nitrate and fluoride, which follow the Namibian guidelines for the evaluation of drinking-water quality for human consumption, with regard to chemical, physical and bacteriological quality. In this case the groupings has the following meaning:

Group A: Water with an excellent quality
Group B: Water with acceptable quality
Group C: Water with low health risk
Group D: Water with a high health risk, or water unsuitable for human consumption.

According to the Ministry of Agriculture, Water and Forestry (MAWF, 2006) the farms are located inside the Tsumeb-Otavi-Grootfontein Subterranean Water Control Area, Government Notice 1969 of 13 November 1970 and Proclamation 278 of 31 December 1976 (Extension). The farms also fall under a sub-division of the water control area (Tsumeb - B2), known as the eastern half of the Tsumeb-Abenab Synclinorium sub-catchment (Bäumle, 2004). Government regulates groundwater usage in this area and all other groundwater related activities like drilling, cleaning or deepening of boreholes and rates of water abstraction. See Figure 5-5 for a map indicating the water control area, groundwater basin and inferred groundwater flow.

The aquifer has a high hydraulic conductivity and over abstraction may cause the formation of a localised cone of depression. Although high volume abstraction currently takes place in the Otavi Mountain Land, the only significant cones of depression known to exist were at the Tsumeb mine (Hoad, 1992) and at the Kombat mine, which is situated much further south (Figure 5-7).

During the peak activities of the Tsumeb mine, the water level was decreased to a depth of about 1,700 m. Groundwater was abstracted on average at 500 m³/h to 600 m³/h and during peak times at 1,000 m³/h. This abstraction lasted for several decades, with a stable cone of depression that developed at a radius of approximately 2 km around the mine shaft (GKW Consult, et. al.; 2003).

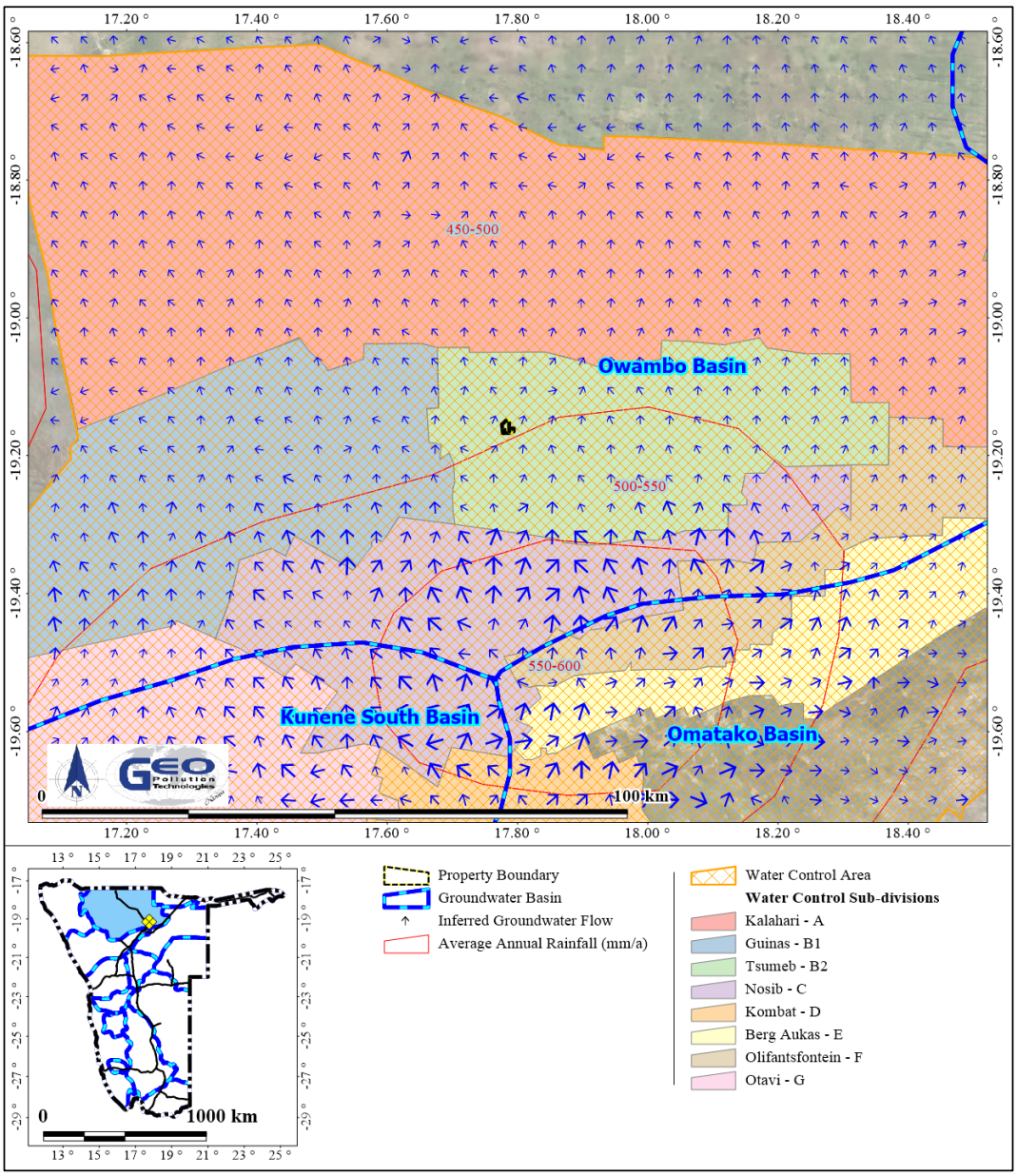


Figure 5-5 Groundwater basin with rainfall and inferred groundwater flow

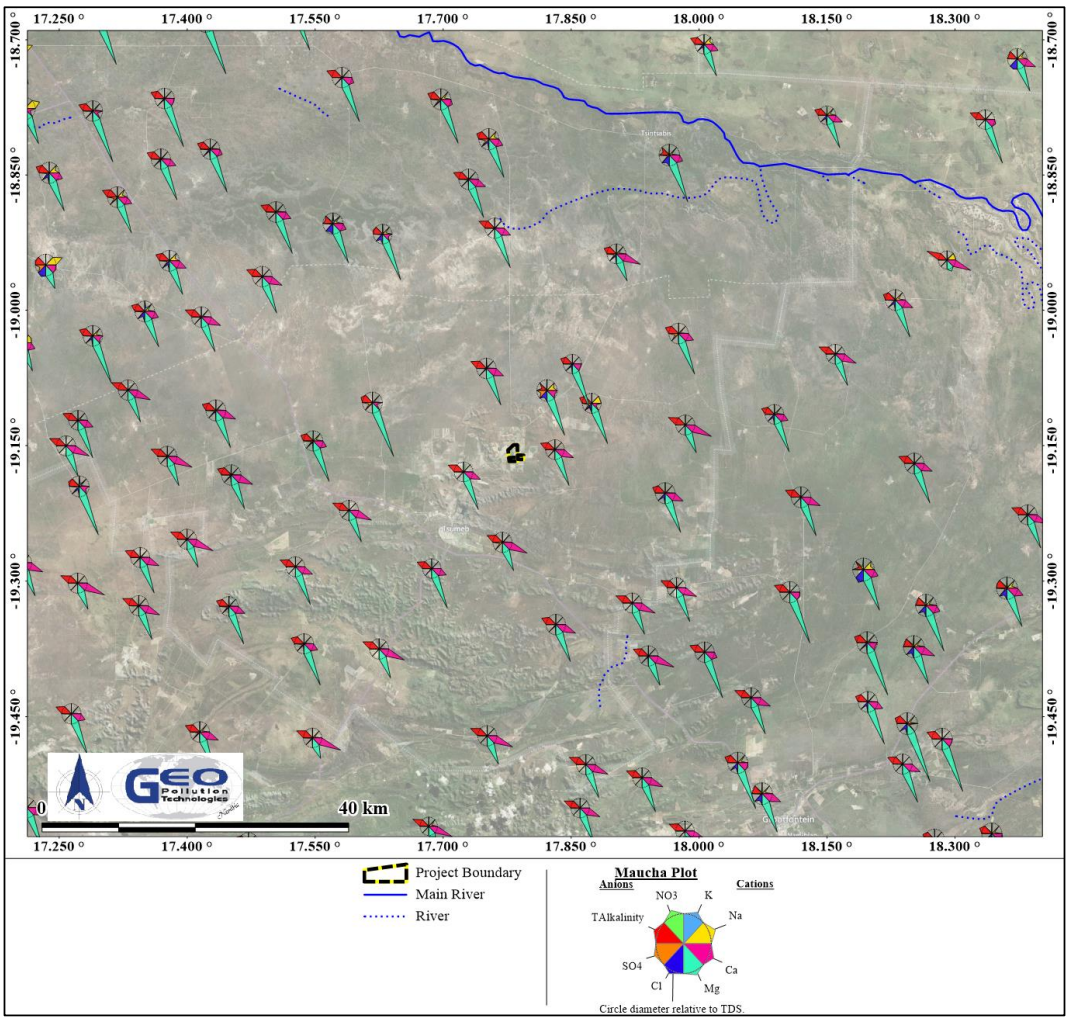


Figure 5-6 Groundwater quality

Implications and Impacts

Local groundwater recharge is governed by a relatively thin Kalahari deposit. Recharge from the Otavi Mountain Land further to the south is likely the main source of groundwater recharge.

5.6 Assessment Of Water Level Monitoring Data

Regional water level monitoring data was sourced from the MAWF. A selection of monitoring hole data was made, roughly following the inferred groundwater flow path, see Figure 5-7. Borehole WW30694 is located just north of the Kombat Mine, with WW27811 located close to the groundwater divide. Boreholes WW21623 and WW200213 is located south of Tsumeb in the more mountainous area, with boreholes WW200202, WW200207, WW32624 and WW40931 all located north of Tsumeb in the flatter terrain. The selected boreholes present a range of boreholes stretching from just south of the water divide, past the project farm and beyond, roughly following the general groundwater flow direction (i.e. from near the water divide and past and beyond the farm). Figure 5-8 presents a cross section of the terrain as well as the minimum, average and maximum water levels of the boreholes. See Figure 5-7 for the profile location and Figure 5-9 for water level information of the relevant boreholes. Figure 5-8 indicates that the boreholes closer to the water divide shows larger groundwater level fluctuations and that the fluctuations becomes insignificant as one moves away from the water divide. The project area is

located between WW200202 and WW200207, suggesting the area would have little water level fluctuations.

In Figure 5-9 it is evident that most of the water level data has a slight saw tooth profile, notably after January 2006 onwards. Rapid increases in water level are mostly associated with monthly rainfall exceeding 150 mm. These increases are subsequently followed by a steady decrease in water level. The most dramatic increases in water level is observed in data from WW27811, which is located close to the water divide where recharge is considered to be comparatively high. Figure 5-9 also presented noteworthy events like flooding of the Tsumeb mine as well as various similar events related to the Kombat mine. The first of these events is the November 1988 flooding of the Kombat mine. This caused a loss in production of about a year, with dewatering operations only starting a few months after flooding. This event is associated with a clear rise in water levels in WW27811. During August 1996 the Tsumeb mine was finally flooded. No clear impact on the regional groundwater levels is obvious. During 2001 the Kombat mine was again flooded but it seems as if dewatering started shortly after the event as no clear impact on regional water levels is noted. In the fourth quarter of 2005 the Kombat mine was again flooded and dewatering only started during the third quarter of 2006. This flooding event, coupled with very high rainfall received in the same time clearly impacted on regional water levels. Water levels, specifically in WW30694, near the Kombat mine increased until dewatering started in 2006, from where a decrease is again noted. This decrease continued until the final Kombat Mine flooding of 1 December 2007. From this point all boreholes shows a definite increase in water level. Around 2012 the water levels started decreasing again and it is speculated that this is due to abstraction taking place from Kombat mine by Namwater. Based on the information presented it seems as if abstraction from the Kombat mine has a significant impact on water levels of the region. More so than the local irrigation taking place in the Tsumeb area.

It is evident from the water level data that the water levels of most of the monitor installations is currently higher than what is was approximately 20 years ago. Careful monitoring is however required to properly manage this resource especially with increasing abstraction from the area.

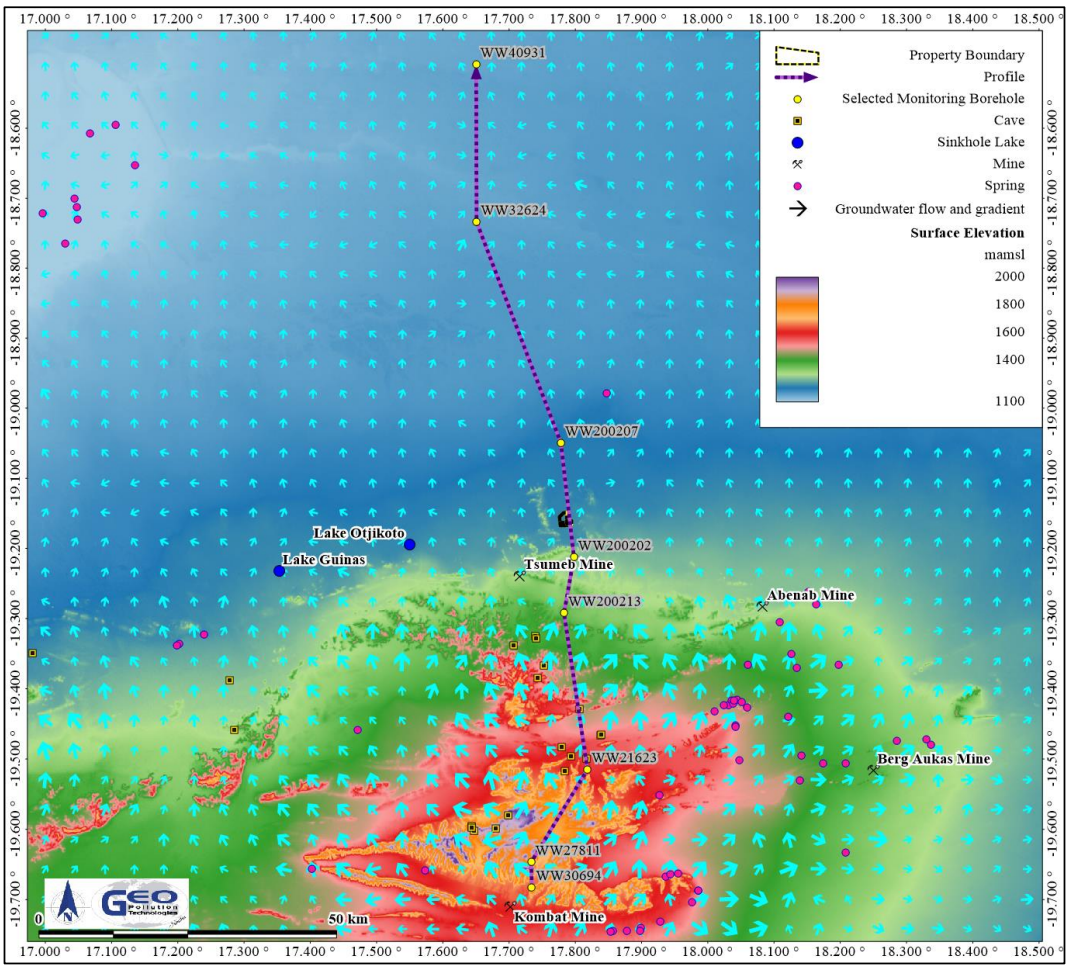


Figure 5-7 Monitor borehole locations, caves, sinkholes and springs

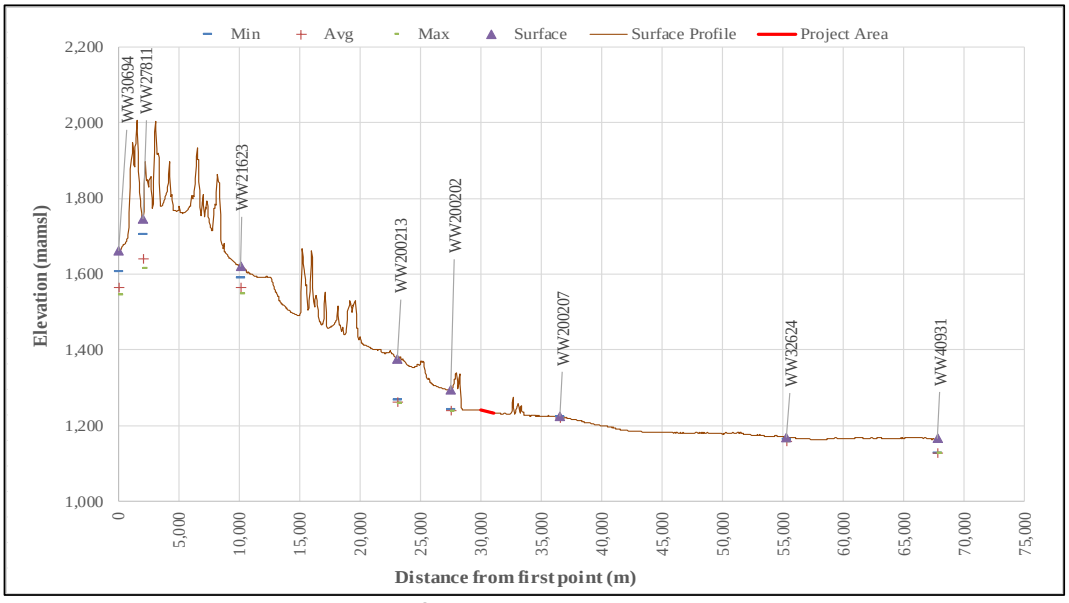


Figure 5-8 Regional water level profile

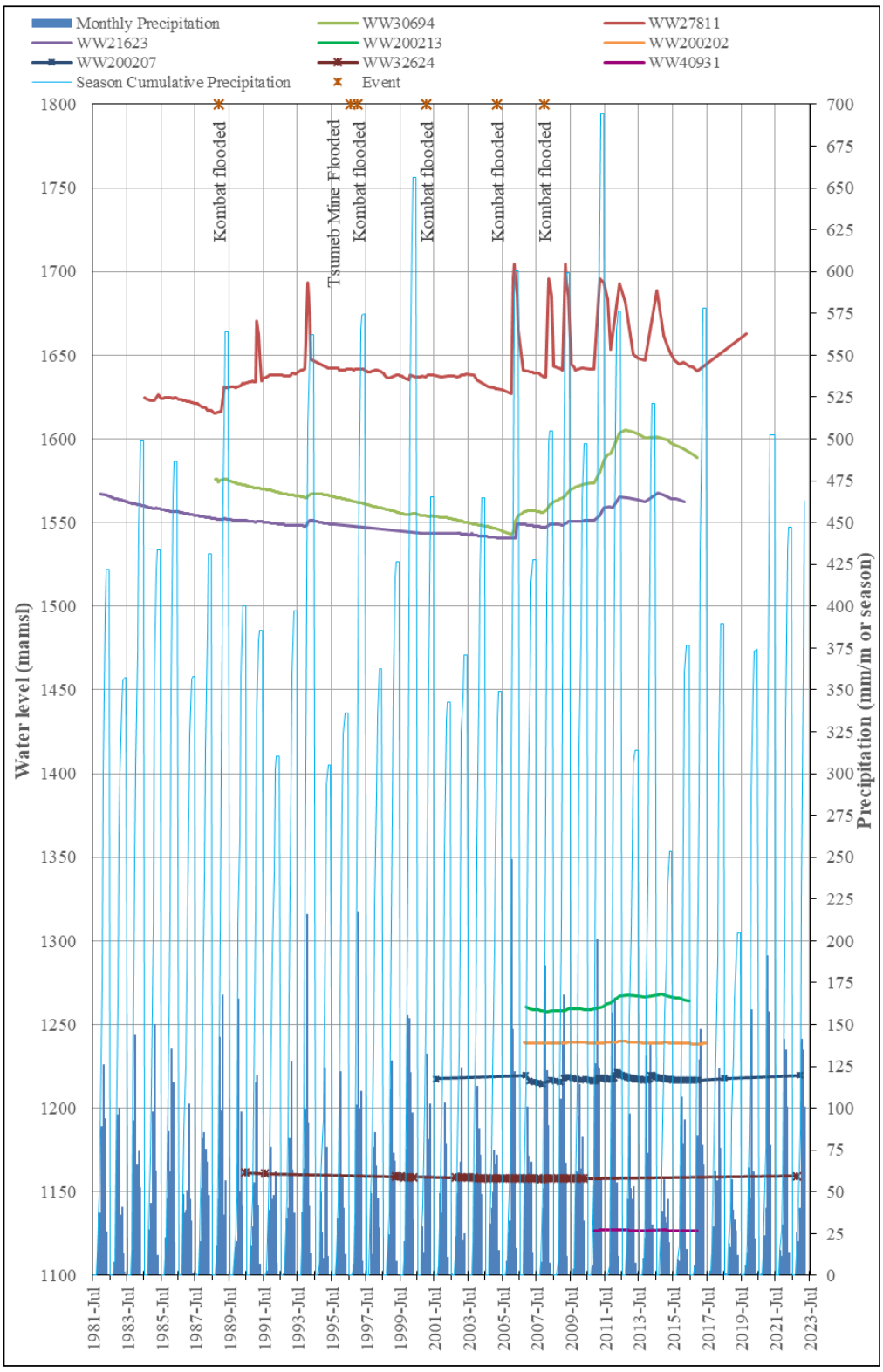


Figure 5-9 Regional water level changes and precipitation

6 PROJECT WATER SUPPLY

6.1 GROUNDWATER USAGE

The only available water supply for the project area is groundwater. Irrigation is from five production boreholes, by means of mainly centre pivot irrigation systems and drip irrigation (WW32515, WW32516, WW35787, WW35718 and WW35785) (Figure 6-1). More boreholes are present on the farm and are used for domestic and stock watering purposes. See Table 6-1 for water use allocation from these boreholes.

Neseier had an abstraction permit for 260,000 m^3/a, which expired in 2022, the renewal process is in progress. Uitkoms currently has an abstraction permit for 150,000 m^3/a, which is still valid until February 2023 and Baobab currently has an abstraction permit for 130,000 m^3/a, which is valid until 2025.

Table 6-1 Summary of borehole information obtained from the Proponent

Map number	WW number	Latitude (°S)	Longitude (°E)	Water use Domestic	Water use Stock	Water use Irrigation
EB1	WW35785	-19.16494	17.78734			Yes
EB2		-19.16539	17.78738	Yes		
EB3	WW35787	-19.16504	17.78812			Yes
EB4	WW37518	-19.16088	17.79403			Yes
EB5		-19.16084	17.79397	Yes		
EB6	WW32516	-19.15387	17.77979			Yes
EB7	WW32515	-19.153	17.78244			Yes
EB8		-19.15253	17.7826	Yes	Yes	
EB9		-19.15862	17.78335	Yes	Yes	

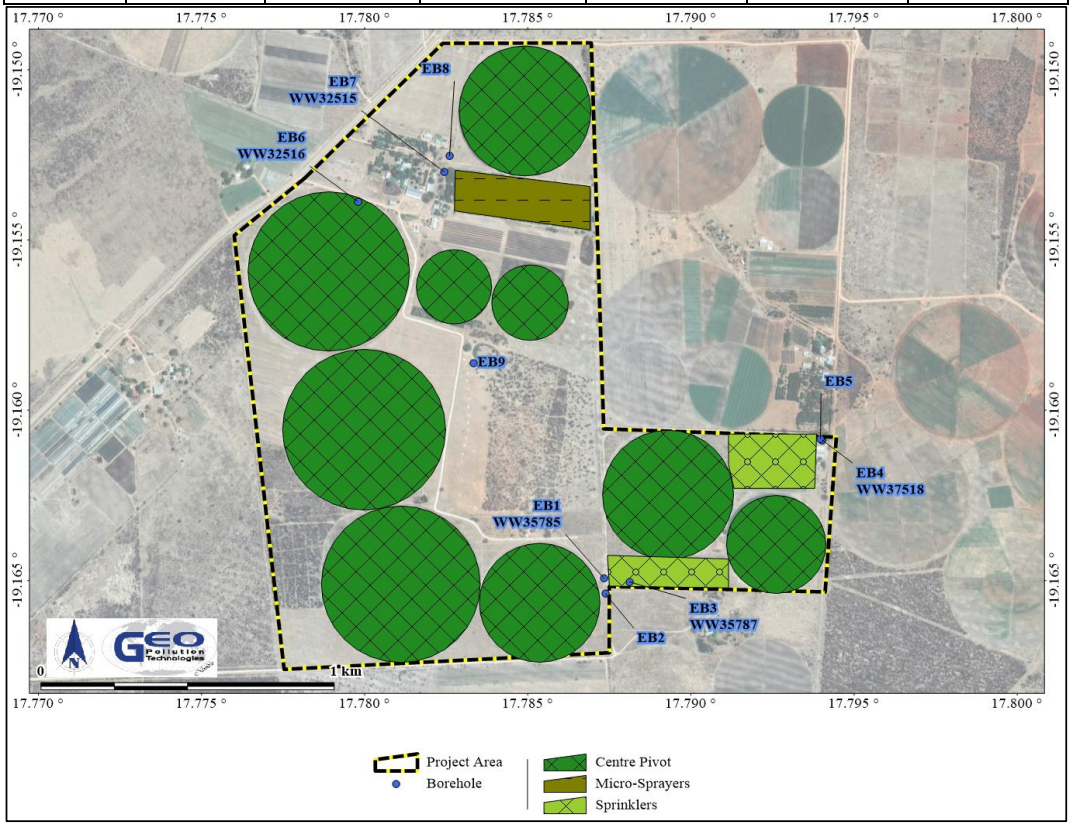


Figure 6-1 Borehole locations

6.2 AQUIFER TESTING

None of the 5 permitted abstraction boreholes utilised for irrigation was tested as no significant drawdown could be created during abstraction to meaningfully test the sustainability. Long term pumping from these boreholes over decades indicate stable water levels with very little changes, mainly influenced by rainfall. This is also clear in the DWA monitoring borehole data as measured in boreholes WW200202, upstream of the project area and WW200207 further downstream. See Figure 5-7 for borehole location map and Figure 6-2 for a comparison of water levels depth below surface and precipitation.

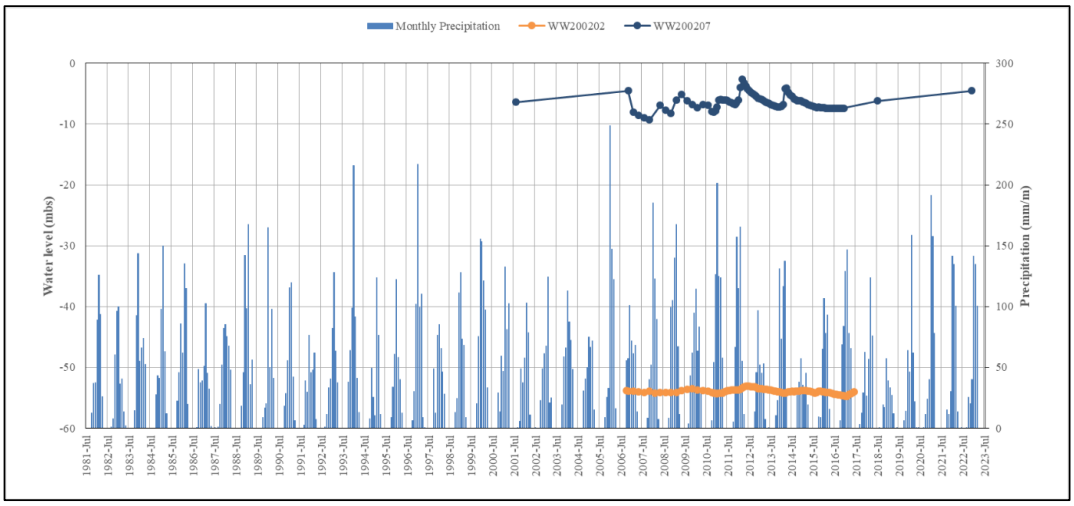


Figure 6-2 Groundwater levels below surface and monthly precipitation

Implications and Impacts

Local groundwater levels seems to be stable and regional abstraction is therefore still considered to be within sustainability levels. The lack of long term groundwater level monitoring data from the government is a major concern, especially for the last 5 years.

7 ASSESSMENT OF IMPACTS

The purpose of this section is to assess and identify the most pertinent environmental impacts and provides possible mitigation measures that are expected from the project. The Rapid Impact Assessment Method (Pastakia, 1998) will be used during the assessment. The Environmental Classification of impacts is provided in Table 7-1. Impacts are assessed according to the following categories: Importance of condition (A1); Magnitude of Change (A2); Permanence (B1); Reversibility (B2); and Cumulative Nature (B3) (see Table 7-2). The Environmental Classification = A1 x A2 x (B1 + B2 + B3). The probability ranking refers to the probability that a specific impact will happen following a risk event. These can be improbable (low likelihood); probable (distinct possibility); highly probable (most likely); and definite (impact will occur regardless of prevention measures).

Table 7-1 Environmental classification of impacts (Pastakia 1998).

Environmental Classification (ES)	Class Value	Description of Class
72 to 108	5	Extremely positive impact
36 to 71	4	Significantly positive impact
19 to 35	3	Moderately positive impact
10 to 18	2	Less positive impact
1 to 9	1	Reduced positive impact
0	-0	No alteration
-1 to -9	-1	Reduced negative impact
-10 to -18	-2	Less negative impact
-19 to -35	-3	Moderately negative impact
-36 to -71	-4	Significantly negative impact
-72 to -108	-5	Extremely Negative Impact

Table 7-2 Assessment criteria

Criteria	Score
Importance of condition (A1) – assessed against the spatial boundaries of human interest it will affect	
Importance to national/international interest	4
Important to regional/national interest	3
Important to areas immediately outside the local condition	2
Important only to the local condition	1
No importance	0
Magnitude of change/effect (A2) – measure of scale in terms of benefit / detriment of an impact or condition	
Major positive benefit	3
Significant improvement in status quo	2
Improvement in status quo	1
No change in status quo	0
Negative change in status quo	-1
Significant negative detriment or change	-2
Major detriment or change	-3
Permanence (B1) – defines whether the condition is permanent or temporary	
No change/Not applicable	1
Temporary	2
Permanent	3
Reversibility (B2) – defines whether the condition can be changed and is a measure of the control over the condition	
No change/Not applicable	1
Reversible	2
Irreversible	3
Cumulative (B3) – reflects whether the effect will be a single direct impact or will include cumulative impacts over time, or synergistic effect with other conditions. It is a means of judging the sustainability of the condition – not to be confused with the permanence criterion.	
Light or No Cumulative Character/Not applicable	1
Moderate Cumulative Character	2
Strong Cumulative Character	3

7.1 GROUNDWATER ABSTRACTION

Groundwater abstraction is a very sensitive topic in a dry country where the value of land is drastically reduced if no or unusable groundwater is present on the land. Abstraction of groundwater must be done in a sensible way not to impact on other groundwater users that depend on such groundwater. This includes water abstracted for human and animal use, irrigation, and also ecosystems that depend on groundwater. A typical groundwater balance was compiled to illustrate the potential consequences of over abstraction of groundwater, see Figure 7-1. Recharge to the area is considered to be high. It is considered that recharge can vary from 0% to 4% of rainfall with an average of 2% of the rainfall. In periods of drought there may be no recharge while in above average rainfall recharge could be above 4% (Hoad, 1992).

In a typical groundwater environment, a water balance would consist of inflow and outflow of the groundwater system. Over time an equilibrium (or steady state) is normally reached with rising water tables following good recharge events and declining water tables when recharge is below average.

Inflow into the system would typically be from infiltration following rainfall in the area and in upstream areas. The inflow component will further be enhanced by the high secondary porosity nature of the karst aquifer.

Outflow would be comprised of water leaving the system through springs and as outflow over the lower boundary of the groundwater system as well as evapotranspiration losses. Groundwater abstraction through boreholes is important as this is normally necessary to sustain human and animal demands where such users became essentially dependant on the abstracted groundwater as a reliable and sustainable source.

Typical consequences of over abstraction will include a lowering in the water table. This may lead to the collapse of underground cave roofs where the hydrostatic pressure, used to support the roof of a cave, decrease. The increased flow of water may enhance the dissolution of dolomitic rock, leading to an increase in karst structures. Lowering of water tables may further lead to the drying up of boreholes, springs, underground caves and the subsequent loss of organisms that lives in the subsurface and surface water. Vegetation will also be impacted where such vegetation has access to groundwater.

Based on current water level fluctuations in the area, as presented in Figure 5-8 and Figure 5-9, a short term threshold of 5 m below the long term average water level is set from where abstraction rates should be reduced. Note that this level refers to rest water levels and not pump water levels.

All boreholes should be equipped with a dipper pipe to enable safe water level measurements.

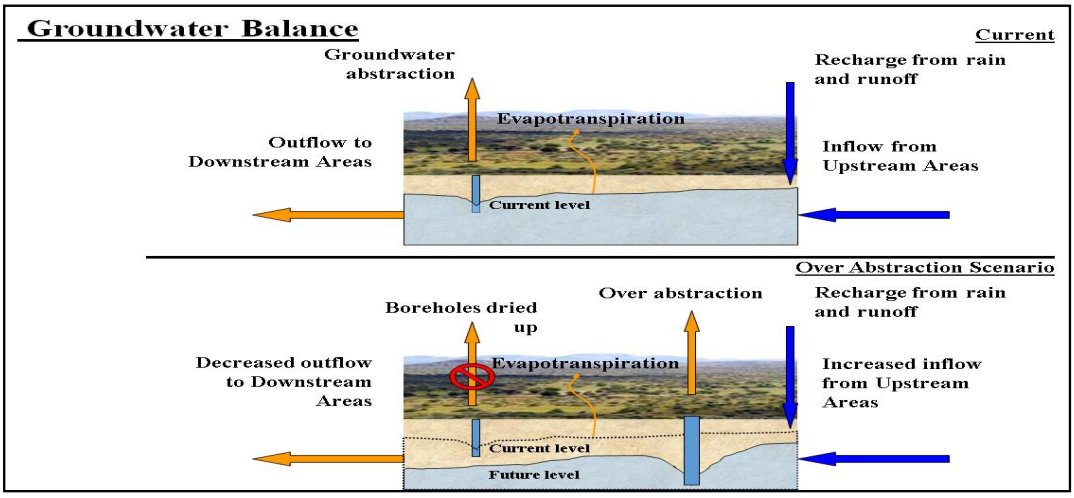


Figure 7-1 Conceptual groundwater balance with over abstraction scenario

Table 7-3 Assessment – Groundwater abstraction

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2)Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Daily Operations	Over-abstraction of the local aquifer, decrease in the local hydraulic head.	2	-2	3	2	2	-28	-3	Probable

Desired Outcome: To utilise the groundwater on a sustainable base.

Actions

Prevention:

- Spread the water abstraction points over a larger area to diffuse the impact.
- Monthly water level monitoring. Borehole EB8 is proposed as a monitoring borehole. Water levels here must be allowed to fully recover before a water level reading is taken.
- Maintain safe abstraction rates prescribed by MAWF in the abstraction permit.

Mitigation:

- Reduce abstraction when the rest water levels decrease with more than 5 m below the long term average.
- Reduce water consumption.
- Optimise water usage.
- Prevent water losses.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Monthly water rest water level monitoring.
- Baseline values should be reviewed every 3 years based on all historic water level data.
- A register of all incidents must be maintained on a daily basis. This should include measures taken to ensure that such incidents do not repeat themselves.
- The Proponent must supply monitoring returns to the MAWLR, as required by the permit.

7.2 GROUNDWATER, SURFACE WATER AND SOIL CONTAMINATION

Leakages and spillages of hazardous substances from vehicles and accidental fuel, oil or hydraulic fluid spills during the operational phase. Increase of nutrient levels (from over application of fertilizers) in the soil that can leach to the groundwater. Pollution due to sewerage system overflow or leakage. Overuse / incorrect application of herbicides / pesticides may also pose a risk.

Table 7-4 Assessment – Groundwater, surface water and soil contamination

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2)Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Daily Operations	Hazardous material, spillages, hydrocarbon leakages from vehicles and machinery.	2	-1	2	2	1	-10	-2	Improbable
Daily Operations	Over application of fertilizer, herbicides / pesticides, etc. Sewerage system malfunction	2	-1	3	2	1	-12	-2	Probable

Desired Outcome: To prevent the contamination of groundwater, surface water and soil.

Actions

Prevention:

- Appoint reputable contractors.
- Vehicles may only be serviced on a suitable spill control structure.
- Regular inspections and maintenance of all vehicles to ensure no leaks are present.
- All hazardous chemicals should be stored in a sufficiently bunded area, as per MSDS requirements.
- Follow prescribed dosage of fertilizers and pesticides / herbicides and to avoid over application.
- Maintain sewerage systems and conduct regular monitoring.
- All hazardous waste must be removed from the site and disposed of timeously at a recognised hazardous waste disposal facility.

Mitigation:

- All spill must be cleaned up immediately.
- Consult relevant Material Safety Data Sheet information and a suitably qualified specialist where needed.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Maintain Material Safety Data Sheets for hazardous chemicals.
- Soil should be sampled and analysed annually to ensure the correct amounts of fertilizer is applied and soil and groundwater quality is maintained.
- Groundwater should be sampled and analysed to test for nitrate concentrations from the fertilizer and for traces of chemicals used in pesticides and herbicides.
- Registers be kept by the farmers on the type, quantities and frequency of application of fertiliser, pesticides and any other chemicals utilised in crop production.
- A register of all incidents must be maintained on a daily basis. This should include measures taken to ensure that such incidents do not repeat themselves.
- All spills or leaks must be reported on and cleaned up immediately.

8 CONCLUSION

Groundwater on the farms is high yielding and of excellent quality, ideal for human consumption and utilisation for irrigation purposes, although care must be exercised when long term irrigation takes place on unsuitable soil.

Based on current water level fluctuations in the area, as presented in Figure 5-8 and Figure 5-9, a short term threshold of 5 m below the long term average rest water level is set from where abstraction rates should be reduced. This threshold may require adjustment during drought periods as abstraction from neighbouring farms may also influence the regional water levels. Careful cooperation between neighbouring farms and beyond is required to optimally utilize the groundwater resource without depleting it, as depletion will be detrimental to all. This should include self-monitoring and assessment of water levels in the area as monitoring data obtained from DWA indicates a lack of sufficient monitoring by DWA in the recent years. Proper monitoring data will provide the required information to make informed decisions and will assist to obtain increased abstraction volume permits when needed and if justified.

Groundwater vulnerability to contamination would be the highest around boreholes, around geological structures as well as where shallow groundwater is present. Contaminated surface runoff can create a pathway to the groundwater, putting the groundwater at risk. Potential sources of groundwater pollution include normal runoff from roofs, properties and surfaced areas, e.g. roads. These impacts are normally of a low magnitude and can be managed through proper housekeeping.

Based on current water level and abstraction volumes it seems as if higher abstraction volumes may be considered.

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Appendix C: Trees list for the project area

Tree inventory for quarter degree squares 1917BB (Curtis & Mannheimer, 2005)

Scientific Name	Common Name	Abundance	Notes
Acacia ataxacantha	Flame-thorn	Common to Abundant	
Acacia erioloba	Camel-thorn	Common to Abundant	Protected by forestry legislation
Acacia fleckii	Sand-veld Acacia	Common to Abundant	
Acacia hebeclada subsp *hebeclada*	Candle-pod Acacia	Common to Abundant	
Acacia karroo	Sweet-thorn	Uncommon to Rare	
Acacia kirkii subsp *kirkii* var *kirkii*	Floodplain Acacia	No Estimate of Abundance	
Acacia luederitzii var *luederitzii*	Kalahari Acacia	No Estimate of Abundance	
Acacia mellifera subsp *detinens*	Blue-thorn Acacia	Common to Abundant	Aggressive invader
Acacia nilotica subsp *kraussiana*	Scented-pod Acacia	Common to Abundant	
Acacia reficiens subsp *reficiens*	Red-thorn	Occasional	Aggressive invader
Acacia tortilis subsp *spirocarpa*	Umbrella-thorn	Common to Abundant	
Albizia anthelmintica	Worm-cure Albizia; Aru	Common to Abundant	Protected by forestry legislation
Aloe littoralis	Windhoek Aloe	Uncommon to Rare	Potentially threatened by pachycaul trade. Protected by the Nature Conservation Ordinance and listed in CITES Appendix II.
Artemisia afra	African wormwood	No Estimate of Abundance	
Bauhinia petersiana subsp *macrantha*	White Bauhinia	Common to Abundant	
Berchemia discolor	Bird Plum	Common to Abundant	Protected by forestry legislation
Boscia albitrunca	Shepherd's Tree	Common to Abundant	Protected by forestry legislation
Catophractes alexandri	Trumpet-thorn; Rattlepod	Common to Abundant	Invasive in some areas
Cephalocroton mollis		No Estimate of Abundance	
Combretum apiculatum subsp *apiculatum*	Kudu-bush	Occasional	
Combretum hereroense subsp *hereroense*	Mouse-eared Combretum	Uncommon to Rare	
Combretum imberbe	Leadwood	Occasional	Protected by forestry legislation

Scientific Name	Common Name	Abundance	Notes
Commiphora africana	Hairy Corkwood; Poison-grub Commiphora	Common to Abundant	
Commiphora angolensis	Sand Corkwood	Common to Abundant	
Commiphora glandulosa	Tall Common Corkwood	Common to Abundant	
Commiphora glaucescens	Blue-leaved Corkwood	Common to Abundant	
Commiphora tenuipetiolata	Satin-bark Corkwood	Common to Abundant	
Croton gratissimus var *subgratissimus*	Lavender Croton	No Estimate of Abundance	
Croton menyhartii	Rough-leaved Croton	Common to Abundant	
Cyphostemma juttae	Blue Kobas	Uncommon to Rare	Endemic with very small population and threatened with pachycaul trade. Least concern according to IUCN criteria. Protected by Nature Conservation Ordinance. Protected by forestry legislation
Datura spp	Thorn apple	No Estimate of Abundance	Alien with invasive tendencies
Dichrostachys cinerea subsp *africana*	Kalahari Christmas Tree; Sickle-bush	Common to Abundant	Invasive
Dombeya rotundifolia	Wild Pear	Uncommon to Rare	
Ehretia namibiensis subsp *namibensis*	Namibian Puzzle-bush	Uncommon to Rare	
Elaeodendron transvaalense	Transvaal Saffron; Bushveld Saffron	Common to Abundant	
Elephantorrhiza suffruticosa	Skew-leaved Elephant Root	Uncommon to Rare	
Erythrina decora	Namib Coral-tree	Common to Abundant	Endemic to Namibia and very uncommon throughout its range. Protected by forestry legislation.
Euclea undulata var *myrtina*	Common Guarri;Mountain Ebony	Occasional	
Euphorbia guerichiana	Paper-bark Euphorbia	Common to Abundant	CITES Appendix II
Ficus cordata subsp cordata	Namaqua Rock-fig	Common to Abundant	Protected by forestry legislation
Ficus sycomorus	Sycamore Fig	No Estimate of Abundance	Protected by forestry legislation
Ficus thonningii	Strangler Fig	Common to Abundant	

Scientific Name	Common Name	Abundance	Notes
Flueggea virosa subsp *virosa*	White-berry Bush	Common to Abundant	
Gossypium triphyllum		Common to Abundant	
Grewia bicolor var *bicolor*	Two-coloured Raisin-bush	Uncommon to Rare	
Grewia flava	Velvet Raisin	Common to Abundant	
Grewia flavescens	Sandpaper Raisin	Occasional	
Grewia tenax var *tenax*	Small-leaved Cross-berry	Common to Abundant	
Grewia villosa var *villosa*	Mallow Raisin	Uncommon to Rare	
Gymnosporia maranguensis	Tropical Spikethorn	Uncommon to Rare	
Gymnosporia senegalensis	Confetti Spikethorn	Occasional	
Gyrocarpus americanus	Propeller Tree	Common to Abundant	
Helinus integrifolius	Soap Bush	No Estimate of Abundance	
Hyphaene petersiana	Makalani Palm	Occasional	Protected by forestry legislation
Kirkia acuminata	Common Kirkia	Common to Abundant	
Lantana angolensis	Purple Lantana	Common to Abundant	
Maerua juncea subsp *juncea*	Rough-skinned Bush-cherry	Common to Abundant	
Maerua schinzii	Ringwood Tree	Common to Abundant	Protected by forestry legislation
Montinia caryophyllacea	Wild Clove-bush	Uncommon to Rare	
Mundulea sericea	Silverbush	Common to Abundant	
Opilia campestris var *campestris*		No Estimate of Abundance	
Ozoroa paniculosa	Common Resin-bush	Common to Abundant	
Pachypodium lealii	Bottle Tree	Common to Abundant	Vulnerable to pachycaul trade. Protected by nature conservation ordinance. Listed on CITES Appendix II. Near-endemic extending into extreme southern areas of Angola. Protected by forestry legislation
Pavetta zeyheri	Small-leaved Bride's-bush	Occasional	

Scientific Name	Common Name	Abundance	Notes
Peltophorum africanum	Muparara	Common to Abundant	
Philenoptera nelsii subsp *nelsii*	Kalahari Omupanda; Kalahari Apple-leaf	Common to Abundant	
Rhigozum brevispinosum	Simple-leaved Rhigozum	Common to Abundant	
Searsia marlothii	Bitter Karee	No Estimate of Abundance	
Searsia tenuinervis var *tenuinervis*	Kalahari Currant	Common to Abundant	
Ricinus communis	Castor-oil Bush	Uncommon to Rare	Alien with invasive tendencies
Sclerocarya birrea	Marula	Uncommon to Rare	Protected by forestry legislation
Spirostachys africana	Tamboti	Common to Abundant	Protected by forestry legislation
Steganotaenia araliacea var *araliacea*	Carrot-tree	Common to Abundant	
Tarchonanthus camphoratus	Camphor Bush	Uncommon to Rare	
Terminalia prunioides	Purple-pod Terminalia	Common to Abundant	
Terminalia sericea	Silver Cluster-leave	Common to Abundant	
Tinnea rhodesiana	Maroon Bells	Uncommon to Rare	
Triaspis hypericoides subsp *nelsonii*		No Estimate of Abundance	
Vangueria infausta subsp *infausta*	Velvet Wild-medlar	Uncommon to Rare	
Ximenia americana var *microphylla*	Blue Sourplum	Common to Abundant	
Ximenia caffra var *caffra*	Large Sourplum	Occasional	
Ziziphus mucronata	Buffalo-thorn	Common to Abundant	Protected by forestry legislation

Appendix D: Proof of Public Consultation

Notified IAPs

Name	Organisation
U Hoffmann	Chairman, Tsumeb Farmers' Association
Chief Executive Officer	Tsumeb Municipality
Dinna Ipinge	Tsumeb Municipality
Priscilla Ipinge	Oshikoto Regional Council
Frans Enkali	Oshikoto Regional Council
Percy Misika	Ministry of Agriculture, Water and Land Reform
Neels van der Merwe	Ptn 5 of Ludwigshafen No. 480
Ministry of Agriculture, Water and Land Reform	Ptn 6 of Ludwigshafen No. 480
Ministry of Agriculture, Water and Land Reform	Ptn 7 of Ludwigshafen No. 480
Neil Jacobsz	Ptn 9 of Ludwigshafen No. 480
Stoffel Botha	Ptn 10 of Ludwigshafen No. 480
Piet Bergh	Ptn 18 of Ludwigshafen No. 480
Hanli Grobler	Ptn 17 & 18 of Ludwigshafen No. 480
Pieter Greeff	Ptn 19 of Ludwigshafen No. 480
Adolf Barry	Ptn 14 of Ludwigshafen No. 480
Chris Harmse	Ptn 20 of Ludwigshafen No. 480
Siggi Pitsch	Ptn 21 of Ludwigshafen No. 480
Roland Himmel	Friedrichsruhe FMB/01249
Morné Button	Ptn 7 of Ludwigshafen No. 480 (Seed Agro Processing (Pty) Ltd)

Public Participation Notification: Environmental Assessment

Irrigation Based Agriculture Activities of Farms Neseier, Uitkoms and Baobab, Oshikoto Region

Name & Surname	Organisation/Address	Tel / Mobile	Email	Signature
STOFFEL BOTHA	LUDWIGSHAFEN			
HANS AUSEB	480/19.			
ADOLPH. C. BARRY	LUDWIGSHAFEN 480/19			
Maggie Britton	Seed - Ludwigshafen			

Privacy Block

TEL.: (+264-61) 257411 ♦ FAX.: (+264) 88626368
CELL.: (+264-81) 1220082
PO BOX 11073 ♦ WINDHOEK ♦ NAMIBIA
E-MAIL: gpt@thenamib.com

To: **Interested and / or Affected Party / Neighbour** **29 November2022**

Re: **Environmental Impact Scoping Assessment and Environmental Management Plan for Irrigation Based Agriculture Activities on Farms Neseier, Uitkoms and Baobab, Oshikoto Region**

Dear Sir/Madam

Geo Pollution Technologies (Pty) Ltd was appointed by D J van der Berg to undertake an environmental assessment for irrigation based activities on adjoining farms Neseier, Uitkoms and Baobab, all being portions of Farm Ludwigshafen No. 480, in the Oshikoto Region (see location map on page 2). The assessment will be conducted according to the Environmental Management Act of 2007 and its regulations as published in 2012.

Project: Environmental Impact Scoping Assessment and Environmental Management Plan for Irrigation Based Agriculture Activities on Farms Neseier, Uitkoms and Baobab, Oshikoto Region

Proponent: D J van der Berg

Environmental Assessment Practitioner: Geo Pollution Technologies (Pty) Ltd

The Proponent has collectively cleared 129 ha for irrigation of which are irrigated by centre pivot, micro sprayers and sprinkler systems. The main crops cultivated are vegetables and citrus. Irrigation is from production boreholes in line with a water abstraction permits as issued by the Ministry of Agriculture, Water and Land Reform. Pending the outcome of the environmental assessment, the total water abstraction per year, may be increased.

The environmental assessment will include all infrastructure and operational activities associated with the agricultural activities on the farm. This include land clearing, soil preparation, planting, pest control and fertilizer use, harvesting and support services such as electricity supply, staff accommodation and effluent disposal.

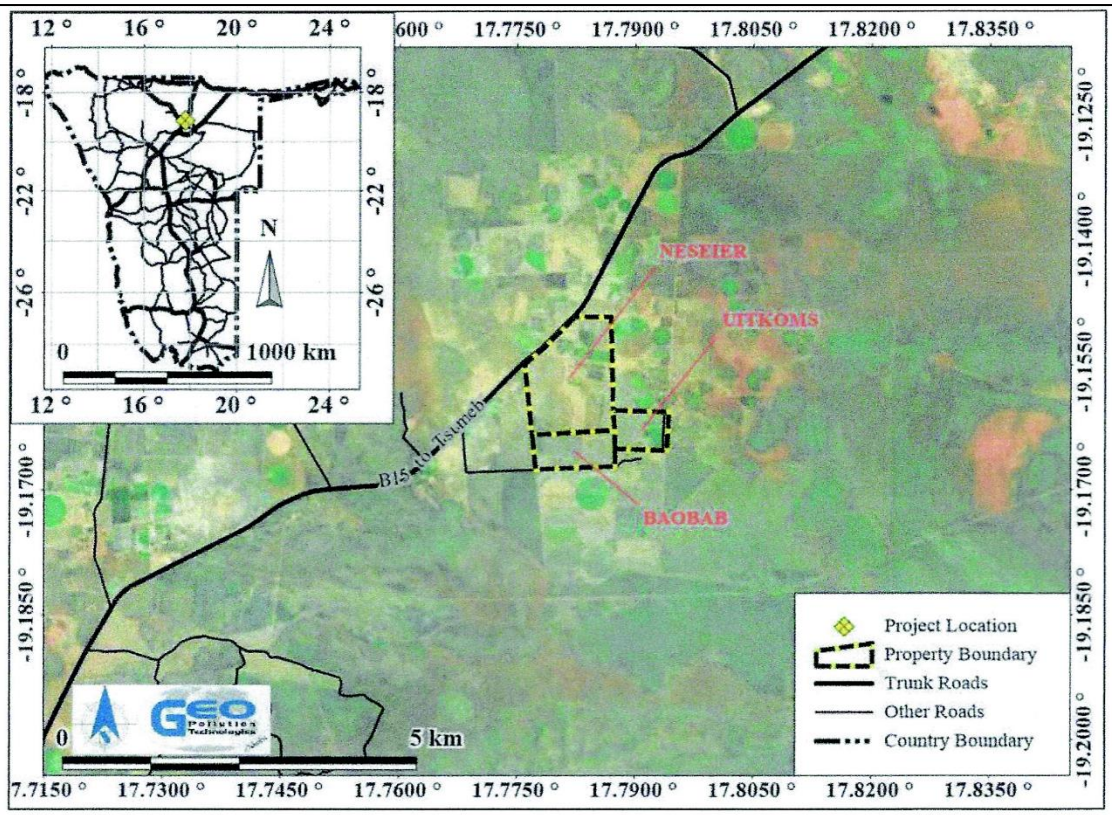
Interested and affected parties or neighbours are invited to register with the environmental consultant, to receive further documentation and communication regarding the project, or to provide comments related to the project, for inclusion in the assessment. Please register or submit comments at:

Fax: 088-62-6368 or **E-Mail:** neseier@thenamib.com

Should you require any additional information please contact Geo Pollution Technologies at telephone 061-257411.

Sincerely,
Geo Pollution Technologies

André Faul
Environmental Scientist



Project Location

Advertisements

NEWS IN SHORT

Roads along Orange River closed

The tarmac road between Oranjemund and Aussenkehr is now officially closed to traffic due to heavy flooding of the Orange River. Last week, the dirt road DR212, from Rosh Pinah to Aussenkehr, was already closed. Atti Stoltz of the Oryx Guest House in Oranjemund said the Orange River has been flowing into the sea at a strong rate for a week now. "However, this is not the highest level the river has run into the sea. I've lived in Oranjemund for thirteen years now, and the water level has been higher." The river washes over the road about 20 kilometres before Rosh Pinah, and only selected vehicles are allowed to drive through. "In earlier years, when it was only a dirt road, the river always washed away the road, and we had to drive through the Sperrgebiet to Lüderitz and then Keetmanshoop. When they decided to build the tarmac road, they took the highest watermark of 1997/81 and built the road even higher

Xinfeng wants more lithium export

Xingfeng Investments says it will have to export lithium ore every month for another three years to cover mining operations, create cash flow, and allow its planned N$500 million lithium processing factory, with a desalination plant, to take off. On Friday, the Chinese lithium company responded to allegations widely published in local media against its operations. Nambili Mhata Legal Practitioners, a law firm, issued the press statement on behalf of Xingfeng. According to Xinfeng, they have already shipped 75,216.36 tonnes of lithium ore to China. The ore is being used in China for tests to design a modern and efficient processing plant, which must be built in Namibia, it says. The ore only contains 1% lithium, Xinfeng added. Mines minister Tom Alweendo briefly stopped Xinfeng's lithium exports, but he told parliament last week that the exports will continue until the end of November. Xinfeng obtained the exclusive prospecting licence 7228 in October 2021. They were awarded an environmental clearance certificate in April 2022. - Augetto Graig

● PEACEFUL DEMONSTRATION HIGHLIGHTS WORKERS' DISCONTENT

Fishing industry workers demand higher quotas

More than 400 employees from Gendev Fishing Group and Princess Brand Processors **have called on the fisheries minister to allocate quotas or allow fishing within the 200-metre contour line.**

NIKANOR NANGOLO
WALVIS BAY

More than 400 employees from Gendev Fishing Group and Princess Brand Processors demanded that the fisheries and marine resources ministry provide fishing quotas to the companies they work for during a peaceful demonstration staged in Walvis Bay last week.

The workers marched and handed over petitions to the fisheries, labour and industrial relations ministries.

The shop steward for Princess Brand Processors employees, Silas Petrus, wanted clarity from the ministry of fisheries on the criteria used when allocating quotas.

"Princess Brand Processors is a Namibian-owned organisation with two vessels and a factory which can accommodate up to 2 500 employees. This organisation has been buying quotas to sustain its employees while seeking an audience with the minister to discuss the allocation of a quota to them. The ministry went silent. Why don't you want to allocate quotas to this company?"

PETITIONS: Workers in the fishing industry handed over petitions last week. PHOTO NIKANOR NANGOLO

REPRESENTATIV: Shop steward Aina Nampweya reading the petition to the Ministry of Fisheries.

SHOP STEWARD: Shop steward for the Princess Brand Processors employees Silas Petrus.

Benefit too

The workers also want to know what changes were brought to the fishing industry based on the Fifth National Development Plan (NDP5) and have called on the fisheries minister to allocate quotas to the company or allow fishing within the 200-metre contour line.

"We request that the minister put politics aside when labour-related matters arise. We want to benefit from these resources as much as other Namibians do. How long should we suffer like this? How will we feed our families, pay rent, and survive if there's nothing or no hope to continue working in this corrupted industry? We are suffering and dwelling around like refugees in our own country.

Ruben Mundilo, a marine engineer at the fisheries ministry, acknowledged and received the petition.

Fewer opportunities

The chairman of the Confederation of Namibian Fishing Associations (CNFA) Matti Amukwa, acknowledged the concerns of the workers and told them that they came to deliver their petition at the wrong address.

"Gendev Fishing Group and Princess Brand Processors are not affiliated with CNFA. Even if I accept your petition, there is really nothing much I can do with it because the companies that you represent are not members of the confederation, and the confederation cannot attend to unknown members,"

Shop steward Aina Nampweya emphasised that more challenges and fewer opportunities remain in the fishing industry.

"The Namibian employees employed at Princess Brand Processors and others are the most affected as they cannot provide food for their families. We want the minister to come to the negotiating table and reach an amicable solution with our employer. How accurate are the scientists about not allowing fishing in the 200-metre contour line zone while some vessels are disregarding this restriction."

Survival

Shop steward Hofni Jonas said that workers are demanding that the minister of labour intervene because unemployment is increasing rapidly.

"We want to work so that we are able to take care of ourselves and our loved ones. How will the minister of labour feel if these 1 300 employees are laid off? We also want benefits, including a basic salary, housing, medical aid, and a pension. We respect the authorities that govern this country's resources, but we lost hope in them. "Companies are pleading with the minister of fisheries to permit them to catch within the 200-metre contour line zone in order to provide employment."

Magano Nakapala, the head of administration at the Walvis Bay labour ministry's office, received the petition and promised to channel it to the relevant authorities.

NEWSINSHORT

7-year-old faces murder charge

A two-year-old toddler died instantly after her seven-year-old neighbour allegedly put sand into her mouth and eyes at Ohainghete village in the Nehale Lyambingana constituency.
The incident took place on Saturday evening, and a murder case has been opened.
Oshikoto police regional commander, Commissioner Teopoline Kalompo-Nashikaku, said the seven-year-old boy was left alone in a house with the toddler, identified as Ndeshipanda Naameondeni.
It is alleged he put sand in her eyes and mouth, which led to her death.
"The boy hid the body in a traditional hut and covered her with a blanket. After he hid the body, he went to inform other kids, who had gone to collect firewood, about what he did," she said.
"The suspect is from neighbour's house. He has not yet been arrested and will be taken to a social worker for further handling," Kalompo-Nashikaku said.
The body has been transported to Omuthiya police mortuary for a postmortem.
- TUYEIMO HAIDULA

Namibia to benefit from climate funds

Namibia will be among nine countries to benefit from US$350 million Climate Invest Funds (CIF) will extend in financing and support for nature-based solutions under the nature and climate change investment platform.
This was announced recently during the United Nations Climate Change Conference (COP 27).
According to CIF, Egypt, the Dominican Republic, Fiji, Kenya and the Zambezi River Basin were selected as the first partner countries and regions.
Zambia, Ethiopia, Rwanda, Namibia and Brazil will also receive support for investment plan preparations, in anticipation of receiving further contributions, it said.
CIF CEO Mafalda Duarte said all these countries are on the frontlines of the climate crisis and can greatly benefit from nature-based solutions support.
With this support, Africa's Zambezi River Basin countries can maintain valuable ecosystem services that aid food security and economic development and build resilience to climate change, she said.
- ELLANIE SMIT

Millions spent to maintain Etosha roads

● MINISTRY ADDRESSES 'MISCONCEPTIONS'

Not a day goes by without the need to maintain something in any of the national parks, Muyunda said.

ELLANIE SMIT
WINDHOEK

More than N$40 million has been spent on the Etosha National Park's roads, which are largely in a good condition - with the majority being rehabilitated or maintained on a continuous basis.
This is according to a statement issued by the tourism ministry to clarify what it termed 'misconceptions' and 'widespread perceptions' that Etosha is in disarray, with roads and other facilities in a bad state.
Spokesperson Romeo Muyunda said the ministry - in collaboration with stakeholders - has invested in the park's roads.
"From this end, a total of 195 kilometres has been constructed and completed, consisting of 69km between Sonderkop and Olifantsrus and 126km between Olifantsrus and the Galton Gate, including the Dolomite detour to the coast - to the cost of N$35 million."
He said the ministry is currently constructing an 86km stretch of road from Ozonjuitji M'bari to Okaukuejo, which is expected to cost N$7.3 million.
Meanwhile, the ministry is also facilitating the implementation of a recent Cabinet-approved road maintenance strategy to cater for other road sections, totalling 213km, he added.
"The road construction project includes a low volume seal road, emergency borehole drilling and infrastructure for borehole pumping."

'Worst' sections targeted first

Muyunda, however, admitted that there are a few exceptions, particularly in the park's eastern section between Okaukuejo, Halali and Namutoni where roads require maintenance.
He said this is primarily due to the fact that all graders used for road maintenance are being repaired.
As soon as these graders are repaired, work on levelling the roads and bringing them up to acceptable standards will begin, targeting the 'worst' sections first, he said.
"At this point, we would like to remind all our road users, particularly whose driving heavy vehicles, to adhere to the speed limit set in the park. Overspeeding leads to a shorter lifespan of park roads."
He added that there is not a day that goes by without the need to maintain something in any of the national parks.
"We have noticed that some prominent people have gone around the park sniffing for bad things. If you look for it, you will find it."
These same individuals have also spread lies that fires in Etosha are not attended to, he said.
According to Muyunda, there have not been any fires in the park for more than a month and all previous fires reported in Etosha and nearby areas were attended to.
The ministry has a comprehensive fire management strategy that addresses both fire suppression and prevention, he added.

Disturbing trends

"Our waterholes are generally in a good condition. As with any infrastructure or facility, there might be some technical issues affecting the pumping of water, but these are quickly attended to by our officials whenever they are observed or reported."
The ministry further reminded tour operators who conduct tours in Etosha that they are equally responsible for ensuring that the park infrastructure is preserved by adopting responsible behaviour.
Muyunda said they have noted disturbing trends where tourists are allowed to drive off-road and over the speed limit as well as litter and jump out of vehicles. All of this tarnishes the reputation and image of Etosha, he said.

NOT IN DISARRAY: Waterholes and other facilities in Etosha National Park are generally in a good condition, the ministry said. PHOTO: NAMIBIA WILDLIFE RESORTS

KONTAKPERSONE

GENL. MURTALA MUHAMMEDRYLAAN. POSBUS 3436, WINDHOEK
TEL: 061 297 2000 | VOLG ONS OP: ISSN 1560-9448

REDAKTEUR
Frank Steffen
081 124 0882 / 061 297 2316
fsteffen@az.com.na

NUUSREDAKTEUR
Henriette Lamprecht
081 350 3801 / 061 297 2035
henriette@republikein.com.na

SPORTNUUS
Andrew Poolman
081 247 2837 / 061 297 2011
andrew@republikein.com.na

BEMARKINGSKOÖRDINEERDER
Carmen Stenger
081 239 7664/061 297 2102
carmen@synergi.com.na

ERONGO
Otis Finck 081 299 1211
otis@erongo.com.na
Faks: 064 403 451

STREKE
Grootfontein: Elvira Hattingh @ 081 737 3235
Keetmanshoop: Monique Adams @ 081 245 4688
Otjiwarongo: Desiree Gases @ 081 659 6015
Ongwediva: Tuyeimo Haidula @ 081 339 3112

VERKOPE EN AFLEWERING
Madelein Beukes 081 811 2218
circulation@nmh.com.na
Tel: 061 330 504

WEBWERFKODE: 6131 | REPUBLIKEIN@REPUBLIKEIN.COM.NA | 'n Publikasie van NAMIBIA MEDIA HOLDINGS (Pty)Ltd, gedruk deur NEWSPRINT NAMIBIA (Pty)Ltd.

WEER

BINNELAND: Gedeeltelik bewolkte weer asook baie warm tot bloedige warm weer word oor die sentrale noorde tot verre noordwestelike streke verwag.
Enkele donderbuie kan ook oor die Oshikoto-, Otjozondjupa-, Khomas-, Omaheke en verre suidoostelike voorkom.
KUS: Gedeeltelik bewolk en matig, met aanvanklike miskolle.

GETYE: L 09:49 H 13:11 L 19:27

VOORUITSIGTE

WINDHOEK	9°	33°
RUNDU	22°	39°
OSHAKATI	19°	38°
GOBABIS	14°	34°
MARIENTAL	12°	36°
KEETMANSHOOP	9°	29°
WALVISBAAI	12°	22°
LUANDA	25°	29°
JOHANNESBURG	13°	22°
KAAPSTAD	15°	21°

Lot van bobbejaantjie

VAN BL. 1

"Ek is na die ministerie se streekkantoor op Grootfontein verwys. Toe ek daar kom, het hulle haar van my weggevat.

"Hulle het gesê ek moes voor die tyd aansoek gedoen het as ek gewoet het ek gaan die bobbejaan kry en dat hulle haar nou gaan konfiskeer."

Sy sê hulle was ook ontevrede omdat sy vir die bobbejaantjie 'n doek aangesit het en gesê sy meng met die gang van die natuur in.

"Ek het gesê daar is reeds ingemeng toe die ma geskiet is. Die weesbaba is die gevolg van menslike inmenging!

"So iets het nog nooit vantevore met my gebeur nie," sê Nell oor die bobbejaantjie wat sy Alexa gedoop het.

Die baba-bobbejaan wat op Grootfontein uit 'n vrou se sorg verwyder is.

PUBLIEKE BELANG

"Ek het gevra wat hulle met haar gaan doen en waarheen hulle haar gaan neem, maar hulle het geweier om my te antwoord. Ek wou haar melk in die kar gaan haal het, want sy moes amper weer melk kry.

"Hulle sê toe vir my nee, hulle soek nie haar melk nie en ek hoef nie bekommerd te wees nie, alles sal oukei wees," het Nell aan *Republikein* gesê.

Sy sê die bobcjaantjie is daarna in 'n stukkende boks gedruk en agter op 'n bakkie weggevat, terwyl die amptenare steeds haar vrae geïgnoreer het.

"Dit pla my dat hulle nie die melk wou vat nie en ook nie gereageer het op my vrae oor of hulle melk vir haar het nie. Ek kry net die idee dat hulle haar langs die pad gaan uitgooi of haar gaan uitsit.

"Is dit nie in die publiek se belang om te weet wat hulle met die diere doen nie?" het Nell gevra.

MINISTERIE REAGEER

Die ministerie se woordvoerder, Romeo Muyunda, het ook nie enige vrae beantwoord oor wat die amptenare met die bobbejaan gedoen het nie.

"Ons is bewus van die insident. Die ministerie word deur die wet gemagtig om wilde diere te konfiskeer wat na ons mening nie reg hanteer word nie," het Muyunda gesê.

Hy erken die bobbejaan is ingebring om vir 'n permit aansoek te doen.

"Ons was egter nie gelukkig met hoe die dier hanteer word nie en daar was ook nie behoorlik verslag gedoen oor hoe daar aan die bobbejaan gekom is nie.

"Die persoon het vir ons gesê die kleintjie se ma is doodgemaak, maar sy het nie gesê deur wie nie.

"Niks laat 'n persoon toe om 'n baba-bobbejaan in hul sorg te neem of in enige ander een se sorg te plaas nie. So 'n geval moet aan die ministerie, as die verantwoordelike owerheid vir wild, aangemeld word vir ingryping.

"Die bobbejaantjie is na ons toe gebring met 'n doek aan. Die amptenaar het geen keuse gehad as om die dier weg te vat nie.

"Ons raai mense af om wilde diere mak te maak of in te gryp. Gevalle waar ingryping nodig is, moet by die ministerie aangemeld word," het Muyunda gesê.

- elvira@republikein.com.na

Militêre basisse 'val uitmekaar'

VAN BL. 1

Probleme met 'n gebrek aan akkommodasie en stukkende omheining is algemeen by die Kaptein Hendrik Witbooi-barakke op Keetmanshoop, die Okanguati-basis in die verre noordweste, Greenwell Matongo-barakke naby Katima Mulilo en op Gobabis waar 'n spoorlyn deur die Chief Munyuku Nguvauva II-barakke loop en onbeperkte toegang aan enigiemand bied.

Karasburg se Jacob Morenga-barakke het stoorkamers vir ammunisie nodig wat tans aan die natuur se lot oorgelaat word, terwyl die Rooikop-basis buite Walvisbaai soortgelyke probleme ervaar.

Stoorgerieme vir militêre toerusting op Rooikop is ook vervalle. Verder is die store by Rooikop verroes waar voertuie geparkeer word, saam met die werkswinkels, wat bydra tot 'n gebrek aan vervoer.

'n Gebrek aan vervoer is ook algemeen by die oorgrote meerderheid van die militêre basisse.

Die lugmagbasis op Grootfontein se kombuis het in 2017 afgebrand en is nooit herbou nie, terwyl die basis op Rundu se kombuis opgeknap is maar nie in 'n werkende toestand is nie weens 'n tekort aan toerusting insluitend potte. 'n Tweede kombuis – wat slegs 48% voltooi is – is volgens die komitee in aanbou.

Die Grootfontein- en Rundu-basis ervaar albei water-, riool- en elektrisiteitsprobleme weens verouderde infrastruktuur, wat by die meerderheid basisse 'n probleem is. Dit terwyl die NDF al jare een van die grootste begunstigdes van die jaarlikse nasionale begroting is.

- augetto@republikein.com.na

Die Kersliggies in Onafhanklikheidsrylaan. FOTO KRISTIEN KRUGER

VAN BL. 1

"Die raad sal vinnige en doeltreffende dienslewering verseker, sowel as geleenthede vir verbeterde ekonomiese vooruitgang, die ontwikkeling van infrastruktuur en finansiële volhoubaarheid," het sy gesê.

Volgens haar was dit 'n besige jaar met botsende prioriteite en deurlopende finansiële beperkings. Een van die uitdagings wat hulle in die gesig gestaar het, was 'n gebrek aan leierskap in kritieke poste.

"Maar die raad het brawe en die nodige besluite geneem om die strategiese doelwitte te bevorder," sê sy.

- republikein@republikein.com.na

» ACC deel jaarverslag vir 2021-'22

Khomas boaan lys van korrupsieklagtes

Een bemoedigende kurwe wat in die jaarverslag uitgewys word, is die ACC se toenemende sukses in hofsake oor die laaste vyf jaar.

› Augetto Graig

Die meerderheid korrupsieklagte wat in die 2021-'22 boekjaar by die Teenkorrupsiekommissie (ACC) aangemeld is, is in die Khomasstreek.

Dit volgens die ACC se jaarverslag vir dié boekjaar wat verlede week in die parlement ter tafel gelê is en wat Khomas uitsonder as die streek waar die meeste sake van vermeende korrupsie aangemeld is.

Uit 110 sake wat gedurende hierdie tydperk onder die ACC se aandag gebring is, was 57 in die hoofstad se streek. Nog 22 sake is by die ACC-kantoor in die Erongostreek aangemeld, teenoor 18 in Oshana en 13 in Otjozondjupa.

Een bemoedigende kurwe wat in die jaarverslag uitgewys word, is die ACC se toenemende sukses in hofsake oor die laaste vyf jaar. Vanaf die vorige boekjaar toe vier uit vier afgehandelde hofsake op skuldigbevindings uitgeloop het, kon die ACC dié rekord in die 2021-'22 boekjaar selfs verder tot sewe uit sewe verbeter.

Die ACC se direkteur-generaal, mnr. Paulus Noa. FOTO ARGIEF

Voor dit is een saak in 2017-'18 afgehandel, met 'n skuldigbevinding, voor die beskuldigde in een uit die tien sake in 2018-'19 vrygespreek is. In 2019-'20 kon die ACC net vyf uit nege sake wen.

Die verslag sit sake uiteen wat tans ondersoek word, insluitend beweerde omkopery waarby amptenare van die Namibiese polisie (Nampol) in Walvisbaai, Swakopmund en die Wanaheda-woongebied, stadspolisiebeamptes in die hoofstad en immigrasiebeamptes betrokke is.

Die ACC gaan ook voort met ondersoeke na beweerde korrupte praktyke in Omusati waar Nampol en die ministerie van onderwys, kuns en kultuur betrokke is; twee afsonderlike sake rakende die ministerie van stedelike en landelike ontwikkeling; twee sake by die ministerie van werke en vervoer en drie afsonderlike sake waarby die Omuthiya-dorpsraad betrek word. Die Namibiese Kunsteraad (NACN); die staatsbeheerde New Era Publication Corporation (NEPC); die Tsumeb-munisipaliteit; Rehoboth se dorpsraad; lede van Windhoek se stadsraad; en die Zambezi- en Erongo-streeksraad het ook almal bande met aktiewe ondersoeke. Die ondersoek na die aanstelling van 'n nuwe uitvoerende hoof vir Fishcor, die staat se vismaatskappy, duur ook voort.

REGSPROSES

In een aanbeveling wat in die verslag vervat is, voer die ACC aan dat korrupsiesake in die hof geprioritiseer moet word om spoediger uitsprake te kry. Ander aanbevelings is die wysiging van die strafproseswet om voorsiening te maak vir pleitonderhandelinge en die instelling van 'n wet om onverklaarbare rykdom te ondersoek. Die Teenkorrupsiewet van 2003 word ook hersien.

Die ACC se direkteur-generaal, mnr. Paulus Noa, sê instellings met toesighoudende pligte – soos die parlementêre staande komitee op openbare rekeninge – moet die gesag hê om boetes op te lê aan administratiewe hoofde wat hulle skuldig maak aan herhaalde wanbestuur en oorbesteding van staatsgeld.

"Die ACC het sy ondersoeke toenemend verskerp in 'n poging om uitstaande dossiere af te handel. Vele dossiere is tans óf verhoorafwagtend in howe óf by die aanklaer-generaal (AG), hangende haar besluit," het hy bygevoeg.

Luidens die verslag is 36 dossiere oor die betrokke tydperk na die AG se kantoor gestuur, waarvan 20 van die vorige jaar oorstaan. Van dié 36 is 13 tans voor die hof, drie is afgekeur en oor 20 moet nog besluit word.

Sedert die ACC in 2006 op die been gebring is, is 730 dossiere by die AG ingedien, waaruit altesaam 74 nog op 'n besluit wag. Uit 311 sake wat in die hof afgehandel is, kon die ACC 184 skuldigbevindings kry, met 127 sake wat tydelik teruggetrek is of waarin die beskuldigdes vrygespreek is.

Vyf dossiere is na Nampol terugverwys, 242 is steeds voor die hof, en 98 vervolgings is afgekeur.

– augetto@republikein.com.na

Man wat ongeskik verklaar is, binnekort terug in hof

› Kristien Kruger

'n Man wat in 2020 tereggestaan het op 'n klag van verkragting en ná 'n psigiatriese evaluering as ongeskik verklaar is, se saak is nou terug op die rol.

Die Eenhana-landdroshof het op 19 Maart 2020 bevind dat mnr. Kandita Jeremia Shafoihuna geestelik onstabiel is en die saak is gevolglik van die rol geskrap.

Die staat het teen dié beslissing in die hoërhof in Windhoek geappelleer op grond van verskeie beweerde onreëlmatighede tydens die hofverrigtinge.

Regters Claudia Claasen en Herman January het Maandag 'n hofbevel uitgereik wat die beslissing wat Shafoihuna as ongeskik verklaar het, ter syde stel en beveel dat die saak na die hof terugverwys word.

Die staat beweer hulle het nooit 'n volledige psigiatriese verslag rakende die saak ontvang nie. Die verslag op rekord handel na bewering oor 'n ander strafregtelike saak. Die psigiaters se bevindinge is ook onduidelik in die verslag.

Die staat het verder beweer dat die hof nie die verslag aan Shafoihuna, wat nie 'n regsverteenwoordiger gehad het nie, verduidelik het nie.

Volgens Claasen en January se uitspraak het die hof 'n verpligting om onduidelike of moeilike terme aan beskuldigdes sonder verteenwoordiging te verduidelik.

Volgens die staatsaanklaer, adv. Antonia Verhoef, het die landdros ook nie vir Shafoihuna ingelig van sy reg om die verslag se bevindinge te betwis nie.

UITSPRAAK

Claasen en January sê in hul uitspraak dit is nodig vir die hof om in sy verwysing na die psigiatriese evaluering van 'n beskuldigde te spesifiseer watter veld ondersoek moet word.

Indien die hof ingevolge artikel 77(1) van die Strafproseswet die bevel uitreik, moet die beskuldigde se vermoë om 'n behoorlike verdediging saam te stel, vasgestel word.

Artikel 78(2) vereis van die evaluering om vas te stel of die beskuldigde op grond van sy geestestoestand strafregtelik aanspreeklik vir sy misdrywe gehou kan word.

Die staat se appèlaansoek het volgens die uitspraak op grond hiervan geslaag aangesien dié prosedure nie in die betrokke saak gevolg is nie.

Hoewel die verslag wat aangeheg is geen betrekking op die huidige saak het nie, het Claasen en January steeds daarop gewys dat dié verslag onduidelik is. "Ingevolge artikel 78 is hy geestelik onstabiel," lui die verslag.

"So 'n onduidelike bevinding sal 'n verdere verduideliking van die psigiaters vereis," lui die uitspraak.

HOFBEVEL

Claasen en January het bevel dat die saak terug op die rol geplaas moet word en gestipuleer hoe dit verder hanteer moet word.

Die hofbevel vereis dat die regte psigiatriese verslag opgespoor moet word, indien dit wel bestaan. Indien nie, moet 'n nuwe bevel uitgereik word vir die beskuldigde om weer vir 'n psigiatriese evaluering te gaan.

Claasen het ook beveel dat 'n afdruk van die verslag voor die verhoor aan die beskuldigde oorhandig moet word.

Die verslag moet in die teenwoordigheid van die beskuldigde tydens die hofverrigtinge vir die rekord gelees word en indien die beskuldigde nie 'n regsverteenwoordiger het nie, moet die landdros die terminologie in die verslag aan die beskuldigde verduidelik en seker maak dat hy die gevolge daarvan begryp.

Daarna moet partye die geleentheid gegun word vir terugvoering op die verslag en eers dan kan die saak binne die betrokke wetlike raamwerk voortgaan.

– kristien@republikein.com.na

Site Notice


PUBLIC NOTICE:
Environmental Assessment and Environmental Management Plan for Irrigation Based Agriculture Activities on Farms Neseier, Uitkoms and Baobab, Oshikoto Region
In terms of the Environmental Management Act (No. 7 of 2007) and the Environmental Impact Assessment Regulations (Government Notice No. 30 of 2012), notice is hereby given to all potential interested and affected parties that an application will be made with the environmental commissioner for an environmental clearance certificate for the following:
Project: Environmental Impact Scoping Assessment and Environmental Management Plan for Irrigation Based Agriculture Activities on Farms Neseier, Uitkoms and Baobab, Oshikoto Region.
Proponent: D J van der Berg
Environmental Practitioner: Geo Pollution Technologies (Pty) Ltd
The Proponent has collectively cleared 129 ha for irrigation which are irrigated by means of centre pivot, micro sprayer and sprinkler systems. The main crops cultivated are vegetables and citrus. Irrigation is from production boreholes in line with a water abstraction permits as issued by the Ministry of Agriculture, Water and Land Reform. Pending the outcome of the environmental assessment, the total water abstraction per year, may be increased.
The environmental assessment will include all infrastructure and operational activities associated with the agricultural activities on the farms.
This include land clearing, soil preparation, planting, pest control and fertilizer use, harvesting and support services such as electricity supply, staff accommodation and effluent disposal.
Geo Pollution Technologies (Pty) Ltd was appointed by the Proponent to conduct an environmental assessment for the existing and proposed operations. As part of the assessment we consult with interested and affected parties. You are hereby invited to register as an interested and affected party with Geo Pollution Technologies. Registration provides you with an opportunity to submit comments, issues or concerns related to the farm, for consideration in the environmental assessment. Please send your written registration or comments to:
Fax: 088-62-6368 or E-mail: neseier@thenamib.com
Should you require any additional information please contact Geo Pollution Technologies at 061-257411.
Thank you in advance.
Geo Pollution Technologies

Appendix E: Consultant's Curriculum Vitae

ENVIRONMENTAL SCIENTIST **André Faul**

André entered the environmental assessment profession at the beginning of 2013 and since then has worked on more than 175 environmental impact assessments including assessments for the petroleum industry, harbour expansions, irrigation schemes, township establishment and power generation and transmission. André's post graduate studies focussed on zoological and ecological sciences and he holds a M.Sc. in Conservation Ecology and a Ph.D. in Medical Bioscience. His expertise is in ecotoxicological related studies focussing specifically on endocrine disrupting chemicals. His Ph.D. thesis title was The Assessment of Namibian Water Resources for Endocrine Disruptors. Before joining the environmental assessment profession he worked for 12 years in the Environmental Section of the Department of Biological Sciences at the University of Namibia, first as laboratory technician and then as lecturer in biological and ecological sciences.

CURRICULUM VITAE ANDRÉ FAUL

Name of Firm	:	Geo Pollution Technologies (Pty) Ltd.
Name of Staff	:	ANDRÉ FAUL
Profession	:	Environmental Scientist
Years' Experience	:	22
Nationality	:	Namibian
Position	:	Environmental Scientist
Specialisation	:	Environmental Toxicology
Languages	:	Afrikaans – speaking, reading, writing – excellent
		English – speaking, reading, writing – excellent

First Aid Class A	OSH-Med 2022
Basic Fire Fighting	OSH-Med 2022

EDUCATION AND PROFESSIONAL STATUS:

B.Sc. Zoology/Biochemistry	:	University of Stellenbosch, 1999
B.Sc. (Hons.) Zoology	:	University of Stellenbosch, 2000
M.Sc. (Conservation Ecology)	:	University of Stellenbosch, 2005
Ph.D. (Medical Bioscience)	:	University of the Western Cape, 2018

PROFESSIONAL SOCIETY AFFILIATION:

Environmental Assessment Professionals of Namibia (Environmental Practitioner)

AREAS OF EXPERTISE:

Knowledge and expertise in:

- Water Sampling, Extractions and Analysis
- Biomonitoring and Bioassays
- Biodiversity Assessment
- Toxicology
- Restoration Ecology

EMPLOYMENT:

2013-Date	:	Geo Pollution Technologies – Environmental Scientist
2005-2012	:	Lecturer, University of Namibia
2001-2004	:	Laboratory Technician, University of Namibia

PUBLICATIONS:

Publications:	5
Contract Reports	+175
Research Reports & Manuals:	5
Conference Presentations:	1