

APP-001937

**AGRICULTURAL ACTIVITIES ON THE FARMS OKATOMBAKA
NO. 266, PORTION 1 (RIKA) OF OKATOMBAKA NO. 266 AND
BOSVILLE WES NO. 755, OMAHEKE REGION**

ENVIRONMENTAL ASSESSMENT SCOPING REPORT



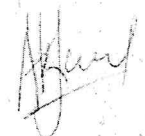
Assessed by:



Assessed for:

O.M. Steyn

November 2020

Project:	AGRICULTURAL ACTIVITIES ON THE FARMS OKATOMBAKA NO. 266, PORTION 1 (RIKA) OF OKATOMBAKA NO. 266 AND BOSVILLE WES NO. 755, OMAHEKE REGION: ENVIRONMENTAL ASSESSMENT SCOPING REPORT		
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Report Approval	 André Faul Conservation Ecologist		

I Ockert Steyn, the Proponent, 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.

Signed at Summerdawn on the 11 day of December 2020.


O.M. Steyn

68090100694
ID/Company Registration Number

EXECUTIVE SUMMARY

O.M. Steyn requested Geo Pollution Technologies (Pty) Ltd to undertake an environmental assessment for their existing agricultural activities on the Farms Okatombaka No. 266, Portion 1 (Rika) of Okatombaka No. 266 and Bosville Wes No. 755 in the Omaheke Region. O.M. Steyn has cleared 397 ha, of which 97 ha is under irrigation and the remainder dryland cropping. Of the 97 ha irrigated land, only 67 ha is cultivated in one planting season, while the remaining 30 ha is left fallow (uncropped). Irrigation is from production boreholes, by means of centre pivot, micro sprinkler and drip irrigation systems. The main produce are moringa, maize and oats. Additional activities performed on the farms include livestock farming and wood and charcoal production. The main operational activities include:

- ◆ wood harvesting and charcoal production,
- ◆ cattle feedlot operations,
- ◆ land preparation,
- ◆ planting,
- ◆ water abstraction and irrigation,
- ◆ fertilizer application and pest control, and
- ◆ harvesting, processing and transporting activities specific to each crop.

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 primary data (hydrogeological specialist study), secondary data and from a reconnaissance site visit. Potential environmental impacts and associated social impacts were identified and are addressed in this report.

The project location lies amidst various other agricultural farms and developments. Due to the nature and location of O.M. Steyn's agricultural activities, some impacts can be expected on the surrounding environment. These are summarised in the impacts table below. Regular environmental performance monitoring is thus recommended to ensure regulatory compliance and the implementation of corrective measures when necessary, especially with regards to water abstraction. O.M. Steyn's operations play a role in contributing to the Namibian agricultural sector as well as employment for the region.

The main concerns related to the operations are potential groundwater, surface water and soil contamination, decreased groundwater availability, ecological and social impacts. A safety, health, environment and quality (SHEQ) policy will contribute to effective management procedures, to prevent and mitigate impacts. All regulations relating to agriculture, labour and health and safety legislation should be adhered to. Groundwater and soil pollution must be prevented at all times. All staff must be made aware of the importance of biodiversity and poaching or illegal harvesting of animal and plant products prohibited. Groundwater abstraction permits must be strictly adhered to. Any waste produced must be removed from site and disposed of at an appropriate facility or re-used or recycled where possible. Hazardous waste must be disposed of at an approved hazardous waste disposal site. By appointing local employees and by implementing monitoring and training programs, the positive socio-economic impacts can be maximised while mitigating any negative impacts.

The environmental management plan included in Section 10 of this document should be used as an on-site reference document during all phases (planning, operations (including maintenance) and decommissioning) of the development. All monitoring and records kept should be included in six monthly reports to ensure compliance with the environmental management plan and the Ministry of Environment, Forestry and Tourism's requirements. 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 should be used in conjunction with the environmental management plan. Operators and responsible personnel must be taught the contents of these documents. Local or national regulations and guidelines must be adhered to and monitored regularly as outlined in the environmental management plan.

Impact Summary Class Values

Impact Category	Impact Type	Construction		Operations	
<i>Positive Rating Scale: Maximum Value</i>		5		5	
<i>Negative Rating Scale: Maximum Value</i>			-5		-5
EO	Skills and Development	2		2	
EO	Revenue Generation and Employment	2		2	
SC	Demographic Profile and Community Health		-1		-2
EO	Agricultural Produce and Economic Diversification		3		3
SC	Traffic		-1		-1
SC	Health, Safety and Security		-2		-2
PC	Fire		-3		-3
PC	Noise		-1		-1
PC	Waste Production		-2		-2
BE	Ecosystem and Biodiversity Impact		-2		-2
PC	Groundwater, Surface Water and Soil Contamination		-2		-2
BE/EO	Groundwater Abstraction		-3		-3
SC	Visual Impact		-1		-1
Cumulative Impact (negative)			-2		-2
Cumulative Impact (positive)			2		2

BE = Biological/Ecological EO = Economical/Operational PC = Physical/Chemical SC = Sociological/Cultural

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LIST OF ABBREVIATIONS

AEZ	Agro-Ecological Zone
AIDS	Acquired Immune Deficiency Syndrome
BE	Biological/Ecological
CHIRPS 2	Climate Hazards Group Infra-Red Precipitation with Station data
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
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
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
SRTM	Shuttle Radar Topography Mission
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 –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.

Green Scheme - The Green Scheme is an initiative conducted by the Ministry of Agriculture, Water and Forestry to encourage the development of irrigation based agronomic production in Namibia with the aim of increasing the contribution of agriculture to the country's Gross Domestic Product. Its aim is also to simultaneously achieve the social development and upliftment of communities located within suitable irrigation areas and to also promote the human resources and skills development within the irrigation sub-sector. Such initiative could possibly enhance cross-border investment and facilitate the exchange of relevant and limited resources with neighbouring countries in this regard.

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

Geo Pollution Technologies (Pty) Ltd was appointed by O.M. Steyn (the Proponent), to undertake an environmental assessment for the agricultural activities on a farming unit consisting of Farms Okatombaka No. 266, Portion 1 (Rika) of Okatombaka No. 266 and Bosville Wes No. 755 in the Omaheke Region (Figure 1-1). The main commercial activities of the Proponent on the farm are crop cultivation, cattle farming and wood and charcoal production. For purposes of crop cultivation, the Proponent has cleared 397 ha, of which 97 ha is under irrigation and the remainder dryland cropping. Of the 97 ha irrigated land, only 67 ha is cultivated in one planting season, while the remaining 30 ha is left fallow (uncropped). Irrigation is from production boreholes, by means of centre pivot, micro sprinkler and drip irrigation systems. The main produce are moringa, maize and oats. For the moringa, an on-site processing plant is present, which involves drying, milling and packaging of its leaves, flowers and seeds according to different market requirements. Additional activities performed on the farms include livestock farming and wood and charcoal production. The main operational activities include:

- ◆ wood harvesting and charcoal production,
- ◆ cattle feedlot operations,
- ◆ land preparation,
- ◆ planting,
- ◆ water abstraction and irrigation,
- ◆ fertilizer application and pest control, and
- ◆ harvesting, processing and transporting activities specific to each crop.

A detailed project description is provided in section 4. The potential impacts of the project on the environment, resulting from various operational, maintenance and construction, and possible decommissioning activities, 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).

Project Justification – The 5th National Development Plan of Namibia (NDP5) recognises the importance of the agricultural sector in Namibia. Currently, agriculture supports approximately 70% of Namibians, and provide employment to roughly a third of the workforce. The NDP5’s desired outcome, in terms of agriculture, is to see a reduction in food insecurity and an increase in food production. The Proponent has a well-established agriculture development. In addition to contributing to food security, moringa as a high value crop for export to international markets, considerably increases the productivity of the land. To sustain the existing agricultural activities, a substantial workforce is required, and as such, a significant number of employment opportunities is created and maintained. The Proponent aims to expand agricultural operations and continuously investigates and implements farming methods to enhance productivity.

Benefits of the agricultural activities conducted by the Proponent include:

- ◆ Food production and enhanced food security for local and potential international markets.
- ◆ Employment and supporting of livelihoods of both unskilled and skilled labourers.
- ◆ Technological development and investment in high value cropping (moringa).
- ◆ Value addition by processing moringa on-site.
- ◆ Contribution towards a positive trade balance for Namibia through the export of moringa.
- ◆ Generation of income that contributes to the national treasury.
- ◆ Support for economic resilience in the area through diversified business activities and opportunities.

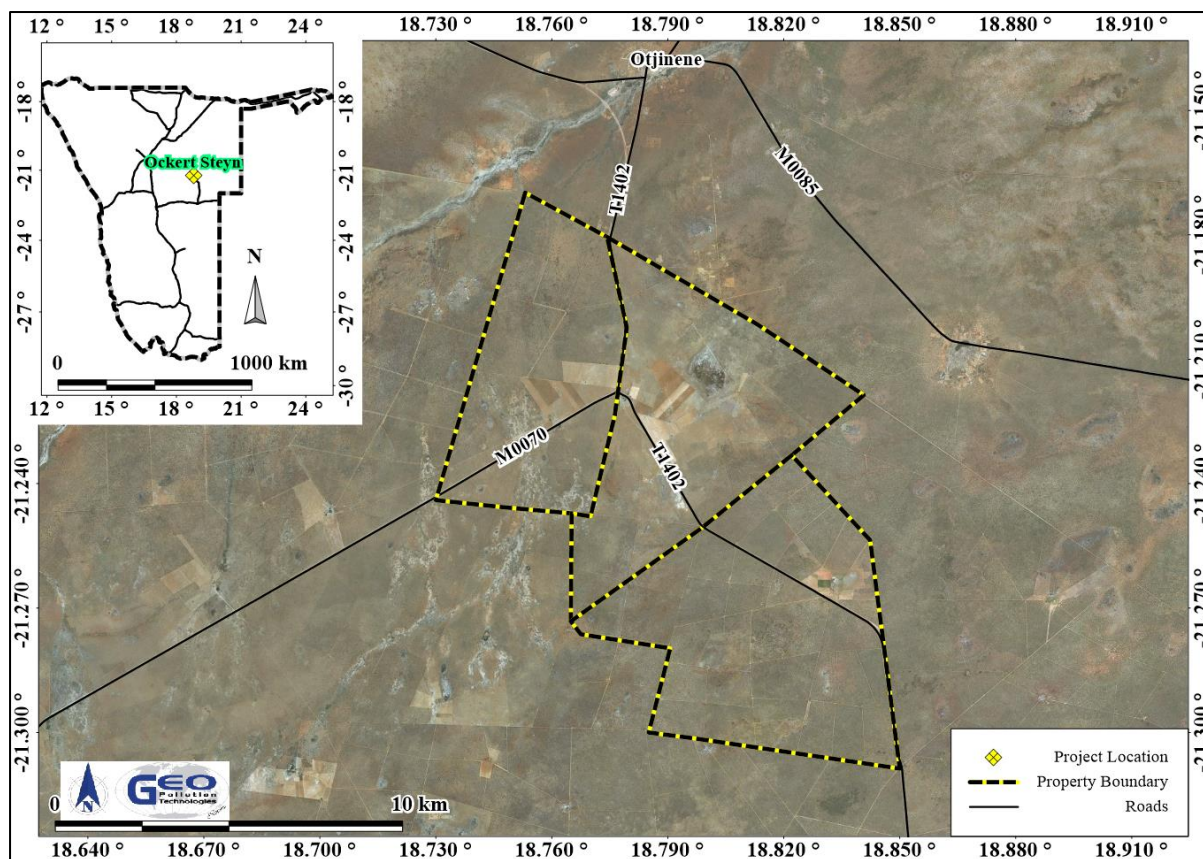


Figure 1-1. Project location

2 SCOPE

The scope of this report is to, in compliance with the requirements of EMA:

1. Present a detailed project and environmental description related to the Proponent's operational activities.
2. Determine the potential environmental impacts emanating from the Proponent's operational activities and potential future decommissioning of such activities.
3. Identify a range of management actions to mitigate the potential adverse impacts to acceptable levels.
4. 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 and report on potential impacts of the Proponent's operational activities on the social and natural environment include:

1. Detailed infrastructure and operational procedures received from the client are presented in this report.
2. Baseline information about the site and its surroundings were obtained from primary information (hydrogeological assessment), existing secondary information as well as from a reconnaissance site visit.
3. 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.

4. As per the findings of this environmental assessment, a scoping report with an environmental management plan (EMP) were prepared and this will be submitted to the MEFT.

4 OPERATIONS AND RELATED ACTIVITIES

O.M. Steyn has been the owner of the farms Okatombaka, Portion 1 of Okatombaka (Rika) and Bosville Wes for a number of years. Agriculture has always been the main economic activity conducted on the farms. Over recent years, agricultural practises were intensified and diversified through various agricultural initiatives on the properties. Where traditional farming practices mainly involved livestock production, it is now supplemented with crop cultivation by means of irrigation and dryland cropping as well as wood and charcoal production. The following sections provide a brief description of the infrastructure, operations and services supply on the farms.

4.1 LAND CLEARING

Mechanical clearing of rangeland for crop cultivation and infrastructure purposes were performed on suitable portions of the farms. The total existing area under irrigation is 97 ha while 300 ha is used for dryland cropping (Figure 4-1).

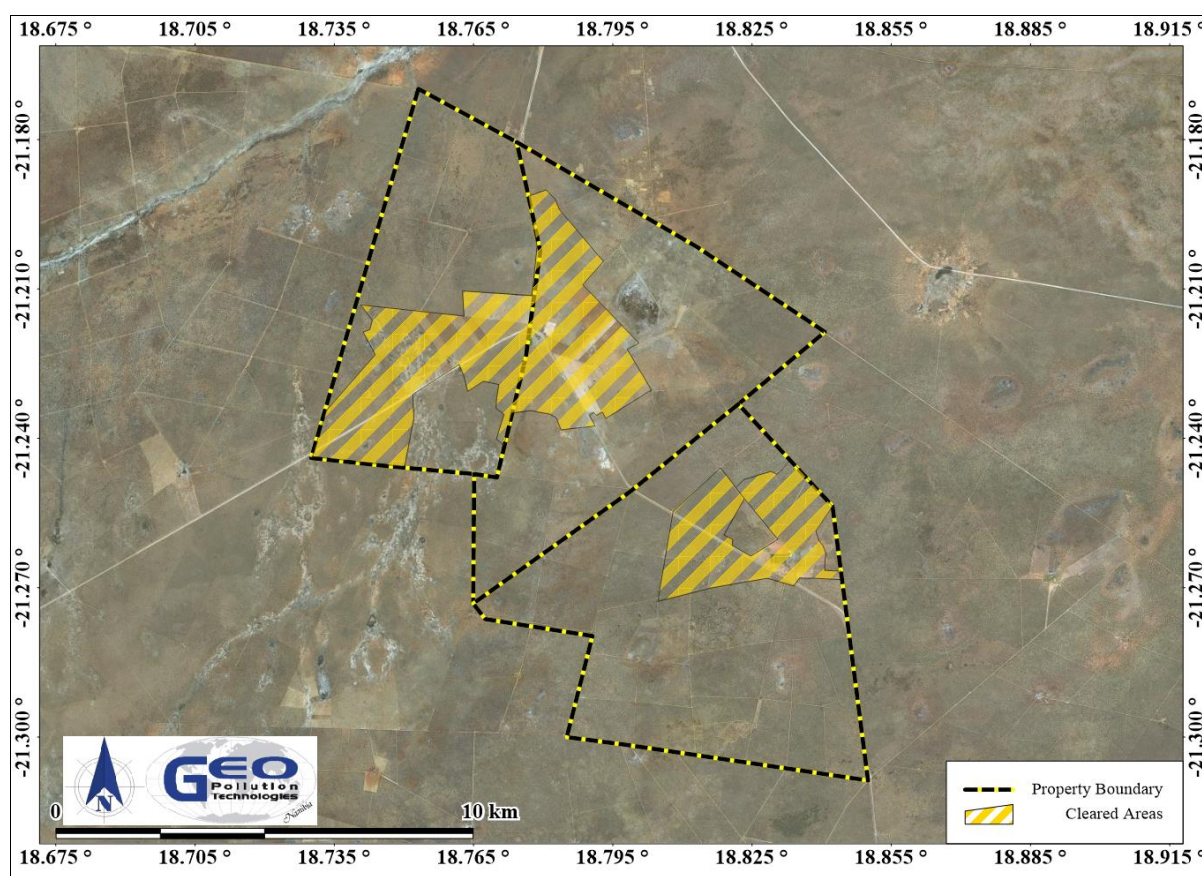


Figure 4-1. Cleared areas of the project area

4.2 CROP PRODUCTION

The main cultivated produce are maize, oats and moringa. A combined area of 300 ha is used for dryland cropping of maize. Fourteen hectare of the 97 ha irrigated land is permanently cultivated with moringa. Of the remaining 83 ha, only 53 ha is irrigated each year, while the remainder is left fallow to allow the soil to rest and regenerate as well as for pest control purposes. This is repeated on a rotational basis, each successive year allowing a new area to remain fallow. The main crop under irrigation on the 53 ha is maize, which is sold to local Namibian mills. Irrigation is performed by means of centre pivot (Photo 4-1). Once maize is harvested it is replaced by oats. Oats is sold and/or used by the Proponent as cattle feed or ploughed back into the soil to increase soil organic content and fertility.



Photo 4-1. Centre pivot irrigated field



Photo 4-2. Moringa under centre pivot irrigation

Moringa (*Moringa oleifera*) (Photo 4-2) is a drought resistant tree originating from northern India and it has gained increasing popularity as a food and health supplement and as an ingredient in cosmetic products. The Proponent mainly produces moringa for the international market (Germany) where it is a high value commodity, but a small local market is also supplied with processed moringa products. In addition to the 14 ha under centre pivot irrigation, about one hectare is under drip and micro sprinkler irrigation. The drip and micro sprinkler irrigation systems are on two separate fields, one field for moringa seed production and one 8 m by 350 m strip acting as wind break between the moringa and maize fields. The wind break aids in preventing spray drift from the maize fields when they are treated with pesticides and fertilizers. All moringa related irrigation fields are located on the Farm Okatambaka alongside the other pivot irrigation conducted.

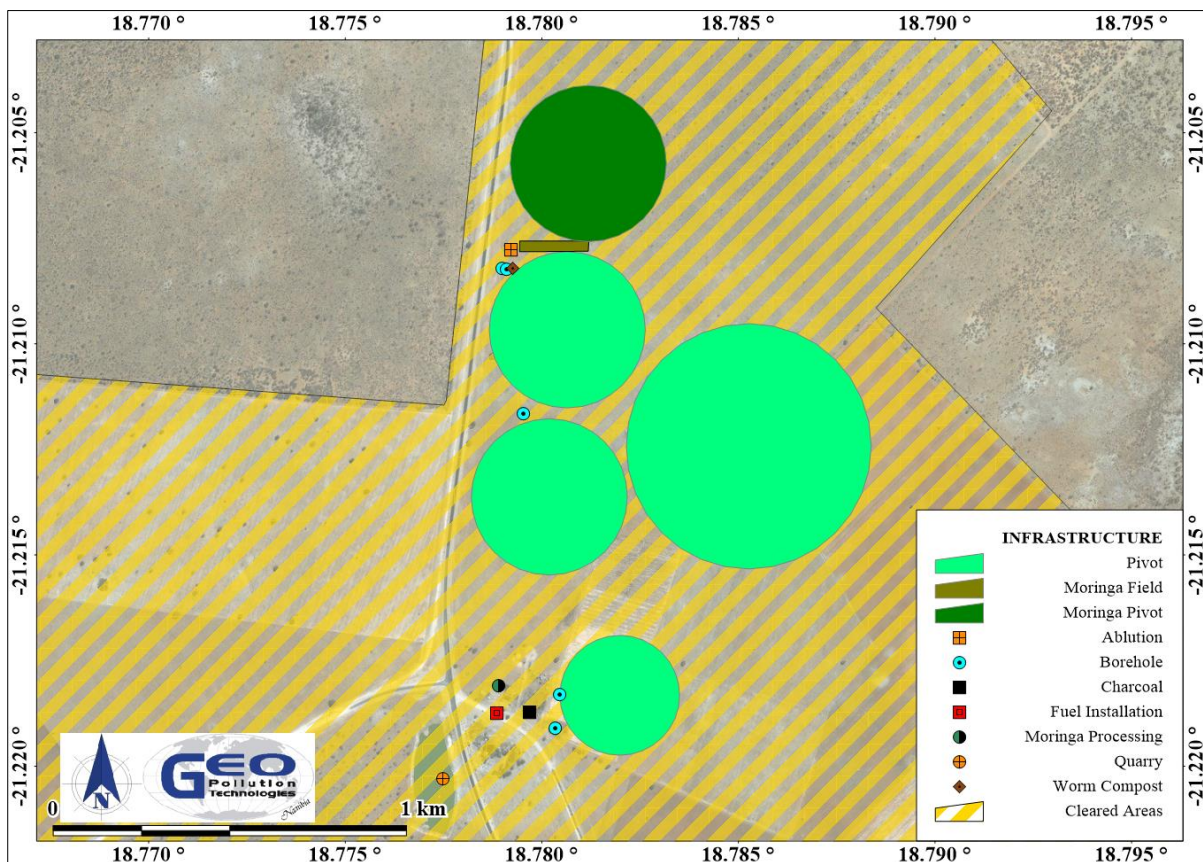


Figure 4-2. Irrigation and infrastructure layout on the Farm Okatambaka

For maize and oats, preparation of the land and planting entails mechanical activities like ripping, tilling and seeding of the soil with tractors and specialised implements. Harvesting is performed with maize harvester machines. Fertilizers and pesticides are applied as required and according to the specifications for application. For irrigated fields, fertilisers are mixed with water in large mixing tanks (Photo 4-3). Once the desired mixing ratio is achieved, the fertilisers are fed into the respective irrigation systems for administration onto the crops. 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.



Photo 4-3. Fertilizer mixing tank



Photo 4-4. Earthworm farms to produce fertilizer

Moringa production is organic with no pesticide application. The Proponent produces his own organic “earthworm tea” and earthworm compost as fertilizer for the moringa plantation (Photo 4-4). Moringa leaves, flowers and seeds are handpicked by workers and then placed in a drier room (Photo 4-6) to allow for complete desiccation. The drier room uses discarded charcoal in a furnace (Photo 4-5) to produce warm air that is circulated through the room to speed up the drying process. Once dry, the leaves are milled and packaged/processed according to different market requirements (Photo 4-7 and Photo 4-8). For export to international markets the powder is packaged in bags, stacked on pallets and wrapped with plastic. These are then ready for transport and shipment. For local markets various products are manufactured. These range from moringa tablets to moringa teas (Photo 4-9 and Photo 4-10). Processing and packaging takes place in a dedicated shed.



Photo 4-5. Drier room furnace



Photo 4-6. Drier room



Photo 4-7. Moringa mill



Photo 4-8. Moringa powder



Photo 4-9. Moringa tablets



Photo 4-10. Moringa tea

4.3 LIVESTOCK

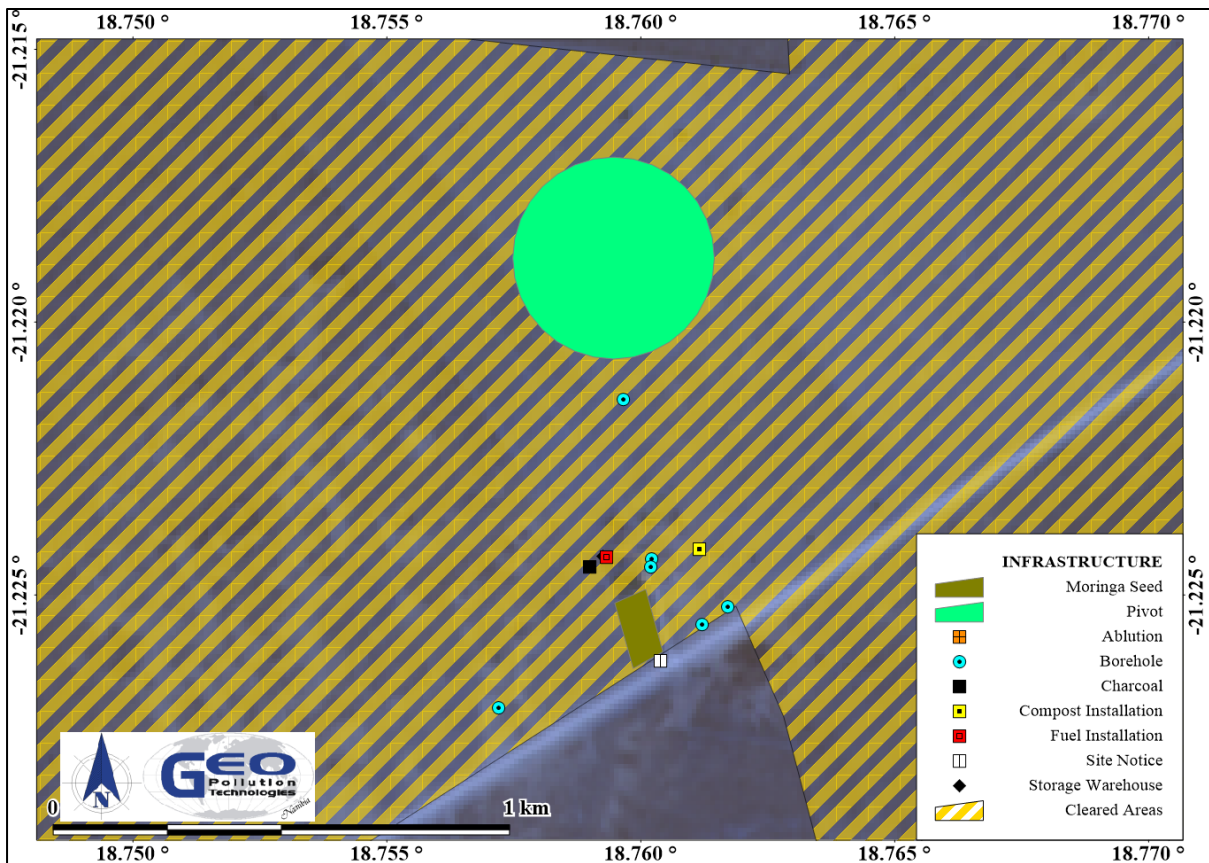
As a supplement to crop cultivation, the proponent also has some cattle for commercial purposes. In addition to grazing, the cattle is fed in a feedlot with maize stover, oats and chipped moringa prunings, which provide excellent quality and highly nutritional feed. Cattle are transported to national markets when they are market ready.

4.4 FIRE WOOD AND CHARCOAL PRODUCTION

The proponent sources unprocessed wood of local thorn trees, focussing on invasive species, from his own and nearby farms. These are then processed into fire wood and charcoal for local and export markets. Fire wood and charcoal production tie in with bush clearing efforts by farmers who actively de-bush land that has become encroached by species like blackthorn (*Acacia mellifera*), sickle-bush (*Dichrostachys cinerea* subsp *Africana*) and blue-thorn *Acacia* (*Acacia mellifera* subsp *detinens*). The Kalahari *Acacia* or “Basterkameel” (*Acacia luederitzii* var *luederitzii*), which is not a commonly recognized encroacher species, although it does encroach in some areas, is also harvested. For fire wood, the collected wood is cut and chopped, packaged in 20 kg bags, and sold.

Charcoal is produced in conventional steel kilns. The kilns are filled with cut wood and ignited. After the content has burned for some hours, the kiln is closed with a steel lid. In some instances, sand is placed on top of the kiln to seal the unit. When the kiln has cooled down, it is opened and toppled over to reveal the charcoal. The charcoal mound is left to further cool down before it is packed and stacked in a designated area. Unlike conventional charcoal production, which burns the kilns at constantly changing locations, the proponent has a designated area for charcoal

production on the Rika no. 266 (Portion 1), see Figure 4-3. All wood is transported there and all burring is conducted at one site. The bulk of the charcoal is shipped to South Africa where the clients will re-package and distribute the charcoal themselves. Limited charcoal is however bagged and sold to local markets.



The Proponent implements and aftercare plan to prevent invader species from encroaching on cleared areas subsequent to initial harvesting. This is achieved by chemical control of regrowth with arboricides which inhibits photosynthesis. The arboricide is manually applied to the soil at the roots of the targeted species. Once it rains, the chemical reaches the roots and is taken up by the plant. Photosynthesis stops and the leaves abscise. Subsequent leaf growth also abscise until such time that the plant has depleted its stored resources and dies.

4.5 IRRIGATION SYSTEMS

Irrigation systems employed on the farm are centre pivots, micro-sprayers and drip irrigation. A brief description of each system is provided below.

Phocaides (2007) provides a concise description of the centre pivot, being a low to medium pressure fully mechanised, automated irrigation of permanent assemble. It basically comprise a sprinkler pipeline (usually of high tensile galvanized light steel or aluminium pipes) supported above ground by mobile A-frame towers, long spans, steel trusses and/or cables. The pipeline is connected to a central tower with the “pivot mechanism” and main control panel. The central tower is a fixed structure with a concrete base secured at a fixed water supply point, in the centre of the pivot (field). The entire system is self-propelled to slowly rotate around the central tower while dispensing water through sprinklers (emitters) connected to the pipeline. An automatic alignment systems ensures the irrigation pipeline remains straight while a drive system enables the system movement.

Mobile towers are typically approximately 3 m in height while being spaced about 30 m apart. The spans are therefore roughly 30 m in length. The entire length of the system may vary from design to design and therefore the size of the irrigated area will also vary. Longer systems will have a greater circumference and larger range. Photo 4-13 depicts a typical centre pivot system while Photo 4-14 and Photo 4-15 presents some of the pivots systems which are being employed in Namibia. The system depicted in Photo 4-14 and Photo 4-15 has a system length of 300 m with spans at a width of 50 m. The irrigated area therefore covered by these systems are 30 ha.



Photo 4-13. Typical Centre Pivot System with Fixed Central Tower (Phocaides (2007))

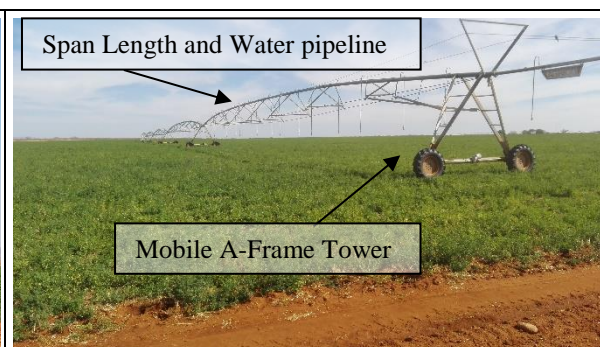


Photo 4-14. Centre Pivot System Pipeline

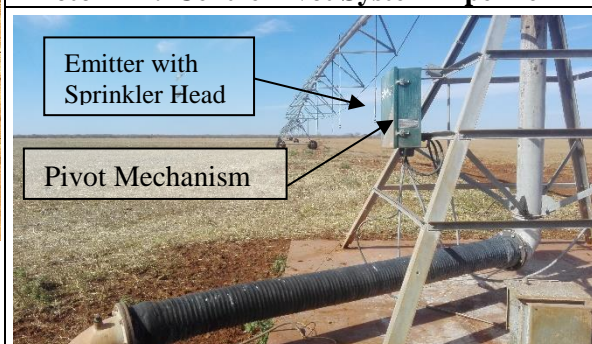
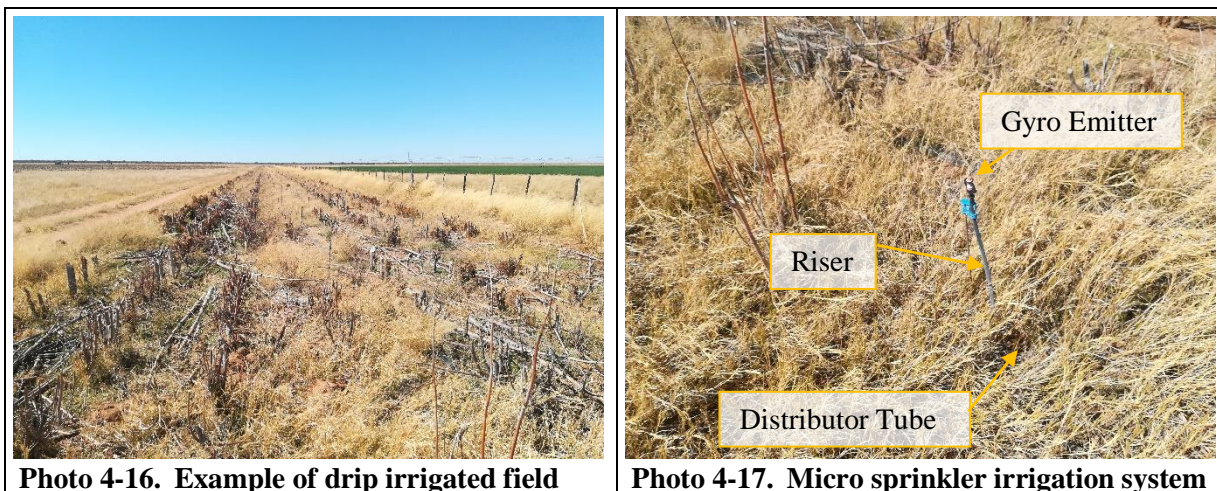


Photo 4-15. Centre Pivot System Employed in Namibia

Drip irrigation is a type of micro-irrigation system that has the potential to save water and nutrients by allowing water to drip slowly to the roots of plants, either from above the soil surface or buried below the surface. The objective is to place water directly into the root zone and minimize evaporation. Drip irrigation systems employed on the farm are perforated plastic pipelines (drip tube) which are used at the adult moringa trees used for seed production.

The third irrigation method comprise a sprinkling system fitted with “Gyro emitters”. The emitters are fitted onto sprinkler “risers” which are held in a vertical position via support structures. The risers are connected to the distributor tube. Micro-sprinklers are made of plastic materials which is resistant to agrochemicals and weather conditions. Emitters are designed to

prevent insect penetration into the area of the sprinklers nozzle. Water is evenly disseminated through the sprinkler system to cover a larger root zone than that of a drip irrigation system. Such systems are mainly used in the moringa fields adjacent to the pivots.



4.6 WATER SUPPLY

The only available water source for the project is groundwater and the farms in the project area rely thus on boreholes for water supply for potable use, irrigation and livestock.

Although the project area falls outside a water control area, the proponent applied for a drilling and abstraction permit at the Department of Water Affairs (DWA) of the MAWLR. The proponent is therefore in possession of a permit authorizing the abstraction of water from boreholes WW204869 through to WW204875, dated 19 May 2017. This permit allows for the abstraction of 149,000 m³ per year, see Appendix A. Groundwater remains the property of the Government of Namibia who permits and regulates water abstraction.

Twenty four (24) boreholes are present on the three farms operated by the Proponent. A summary of the boreholes, with data supplied by the Proponent, is provided in Table 4-1. All data could however not be ascertained for some of the boreholes. The boreholes are used for purposes of potable water supply (domestic use), irrigation and/or livestock watering while two boreholes are currently not used and sealed off.

Of the 24 boreholes, 10 are used for irrigation: two on farm Rika no. 266 (Portion 1), four on farm Okatombaka no. 266 and four on farm Bosville Wes no. 755. Submersible pumps are installed in the boreholes to pump water via buried pipelines to reservoirs, where, on demand, the water is mixed with fertilizer and then transferred to the irrigation systems (i.e. centre pivot, drip and sprinkler systems). Irrigation boreholes are fitted with cut-off valves, non-return valves and pressure regulators. Note that only the irrigation boreholes on farm Rika no. 266 (Portion 1) and Okatombaka no. 266 are fitted with flow meters.

On farm Rika no. 266 (Portion 1) two boreholes at the farmhouse are utilised for domestic use and one is used for stock watering. On farm Okatombaka no. 266 there are three boreholes used for stock watering, while on farm Bosville Wes no. 755 there are six boreholes for stock watering. Figure 4-4 illustrates all the borehole data as received from the Proponent as well as contained in the DWA database on the farms and immediate vicinity. Note that some of the DWA boreholes is not in use any more and also not displayed in Figure 4-4.

Table 4-1. Summary of borehole information obtained from client

Map Ref.	Farm Name	Borehole Name	Use	Borehole Depth (m)	Yield (m ³ /h)	Water Level (mbs)
1	Rika no. 266 (Portion 1)	Rika Gras	Not used	120		7.7
2	Rika no. 266 (Portion 1)	Huis	Domestic		3	
3	Rika no. 266 (Portion 1)	Huis Wind Pump	Domestic			
4	Rika no. 266 (Portion 1)	Pivot Wind Pump	Stock Watering			
5	Rika no. 266 (Portion 1)	Rika Blou	Irrigation	116	40	
6	Rika no. 266 (Portion 1)	Rika Rooi	Irrigation	120	35	
7	Okatombaka no. 266	WW204872	Irrigation	120	30	
8	Okatombaka no. 266	WW204871	Irrigation	120	12	
9	Okatombaka no. 266	WW204870	Irrigation	120	110	4
10	Okatombaka no. 266	WW204869	Irrigation	127	60	3.5
11	Okatombaka no. 266		Not used			
12	Okatombaka no. 266	WW204873	Stock Watering			
13	Okatombaka no. 266	WW204874	Stock Watering			
14	Okatombaka no. 266	WW204875	Stock Watering			
15	Bosville Wes no. 755		Stock Watering			
16	Bosville Wes no. 755		Stock Watering			
17	Bosville Wes no. 755		Stock Watering			
18	Bosville Wes no. 755		Stock Watering			
19	Bosville Wes no. 755	WW15690	Stock Watering			
20	Bosville Wes no. 755		Stock Watering			
21	Bosville Wes no. 755	Kole Boorgat	Irrigation			
22	Bosville Wes no. 755	Ou Boorgat	Irrigation			
23	Bosville Wes no. 755	Nuwe Boorgat	Irrigation			
24	Bosville Wes no. 755	Huisie Boorgat	Irrigation			

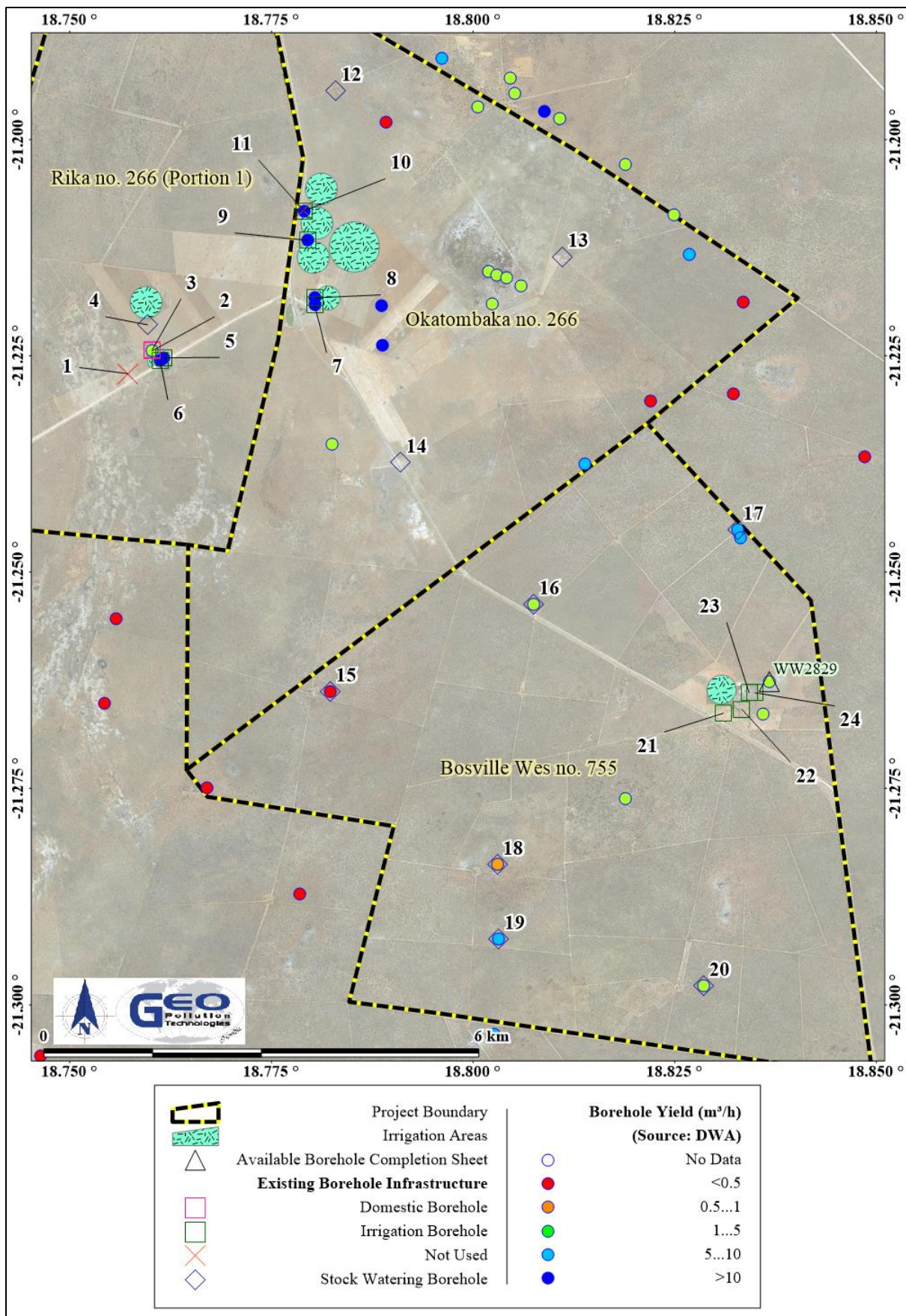


Figure 4-4. Locations of boreholes and irrigation areas



Photo 4-18 Typical borehole installation on Rika No. 266 (Portion 1)



Photo 4-19. Typical stock watering borehole and installation on the Farm Okatombaka



Photo 4-20. Flow meter from the fertiliser mixing tank on the farm Bosville



Photo 4-21. Borehole with flow meter and fertiliser mixer on the Farm Okatombaka

4.7 SUPPORT INFRASTRUCTURE

Operations are enabled and supported by a variety of infrastructure on the farms. In many instances operations will not be possible without the support infrastructure. Figure 4-1 depicts the farm layout and indicates the location of the support infrastructure.

Fuel storage comprises of two aboveground diesel tanks of 9 m³ and 4.9 m³ respectively (Photo 4-22 and Photo 4-23). Both are situated in steel bund areas to serve as spill control. The bund areas have closed outlets that can be used to drain water or fuel from the bunds when required. Each tank has its own dispensing unit situated next to the bund. Diesel is supplied with tanker trucks by a fuel wholesaler.

Waste disposal sites are present on each of the three farms. They consist of excavated pits where waste is regularly burned. Due to a lack of any recyclers in the area, recycling of certain wastes are not possible. However, where possible, certain waste items are not discarded, but rather re-used for alternative purposes. The Proponent is however looking into transporting recyclable waste to waste recyclers in Windhoek.

Electricity is provided by NamPower and supplemented through the use of solar geysers.

Employees are provided with **housing**. Employee houses are serviced with electricity and solar geysers. Toilets are provided for employees through-out operational areas (Photo 4-25). All ablution facilities are connected to septic tank systems for the treatment of **sewage**.

Various **storage and maintenance areas** are located on the properties and comprise of sheds and storerooms where implements and other maintenance material are stored under roof (Photo 4-26). Each farm has its own locked chemical store for pesticides and other hazardous chemicals (Photo 4-27). Maintenance and general repairs are conducted in a workshops.



Photo 4-22. Diesel tank (9 m³)



Photo 4-23. Diesel tank (4.9 m³)



Photo 4-24. Employee housing



Photo 4-25. Ablution facility



Photo 4-26. Shed



Photo 4-27. Chemical store

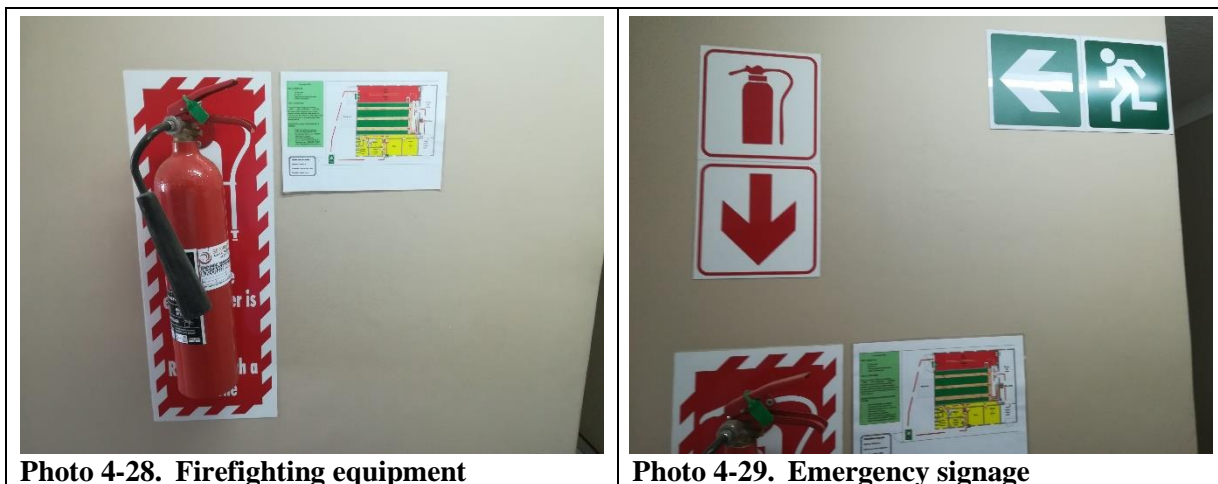


Photo 4-28. Firefighting equipment

Photo 4-29. Emergency signage

4.8 EMPLOYMENT

Operations on the farm sustain approximately 40 permanent employment opportunities. In addition, approximately 150 seasonal workers are employed of which about 30 are female. Permanent workers are provided with housing on the farm. Seasonal workers are sourced from the Otjinene area.

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 and moringa 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. In addition the Ministry of Agriculture, Water and Land Reform has provided the Proponent with a drilling license and an indication of allowable groundwater extraction from such boreholes (as located on the farms). No location alternatives are therefore considered feasible, as the proponent owns and or manages the properties (on behalf of the family), on which operations are conducted.

5.2 PROJECT IMPLEMENTATION AND DESIGN ALTERNATIVES

Various alternatives are continually considered to optimise crop production. Boreholes are already in place and no surface water is available. Therefore, there are no alternative water sources for the 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 constraints 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.

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. The high value of moringa can however accommodate such systems. 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). The estimated average costs are based on 35 ha units. 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	Capital Costs (R /ha)
Flood: Furrow	65%	13,000
Flood: Border	60%	17,600
Flood: Basin	75%	18,800
Sprinkler: Dragline	75%	24,800
Sprinkler: Quick-coupling	75%	22,500
Sprinkler: Permanent	85%	34,500
Sprinkler: Travelling boom	80%	23,200
Sprinkler: Centre pivot	85%	43,300
Sprinkler: Linear	85%	69,400
Sprinkler: Micro sprinkler	85%	36,300
Micro: Spray	90%	53,200
Micro: Drip	95%	46,300

In the Otjinene 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, sprinkler and drip 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.

5.3 NO GO ALTERNATIVE

Agriculture has been a core activity in the Otjinene area for years. Maize is supplied to Namibian mills and the stover used for fodder. Cattle are sold to local markets. This reduces the need for importing of crops, meat and fodder. Moringa is a high value product and the Proponent is the largest producer of moringa in Namibia as well as southern Africa. 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

All projects, plans, programmes and policies with potential adverse impacts on the environment require an environmental assessment, as per the Namibian legislation. This promotes protection of the environment as well as sustainable development. 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	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ Provides for restrictions on the importation of seed ◆ Not in force yet
The Water Act Act No. 54 of 1956	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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)	<ul style="list-style-type: none"> ◆ 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.

Law	Key Aspects
Forest Regulations: Forest Act, 2001 Government Notice No. 170 of 2015	<ul style="list-style-type: none"> ◆ Declares protected trees or plants ◆ Issuing of permits to remove protected tree and plant species. ◆ Issuing of permits for harvesting of trees for wood and charcoal production and transport
Soil Conservation Act Act No. 76 of 1969	<ul style="list-style-type: none"> ◆ 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 Act No. 7 of 2006	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ Defines the powers, duties and functions of local authority councils
Public Health Act Act No. 36 of 1919	<ul style="list-style-type: none"> ◆ Provides for the protection of health of all people
Public and Environmental Health Act Act No. 1 of 2015, Government Notice No. 86 of 2015	<ul style="list-style-type: none"> ◆ 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
Labour Act Act No 11 of 2007, Government Notice No. 236 of 2007	<ul style="list-style-type: none"> ◆ 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)
Atmospheric Pollution Prevention Ordinance Ordinance No. 11 of 1976	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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

Law	Key Aspects
Pollution Control and Waste Management Bill (draft document)	<ul style="list-style-type: none"> ◆ 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.	<ul style="list-style-type: none"> ◆ 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)	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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
South African National Standards (SANS)	<ul style="list-style-type: none"> ◆ The Petroleum Products and Energy Act prescribes SANS standards for the construction, operations and demolition of petroleum facilities. ◆ SANS 10131 (2004) is aimed at above-ground storage tanks for petroleum products. <ul style="list-style-type: none"> ○ Provide requirements for spill control infrastructure

The agricultural and related activities, listed in the Environmental Management Act Regulations (Government Notice No. 29 of 2012), as activities requiring an environmental clearance certificate, 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 term of the Forest Act, 2001 (Act No. 12 of 2001) or any other law. The Proponent harvests trees for fire wood and charcoal production. Proponent has cleared areas for crop production.

Section 7: Agriculture and Aquaculture Activities

- ◆ 7.5 Pest control: The proponent will use conventional pest control products as approved by the Namibian government for some of the produce. No chemical pest control is used on moringa.

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: Water is abstracted from boreholes for cultivation and sale of crops.
- ◆ 8.6 Construction of industrial and domestic wastewater treatment plants and related pipeline systems: The proponent has installed wastewater treatment facilities on the properties to manage mainly black and grey water. These are septic tank and french drain systems

- ◆ 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 farms 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 farms have two consumer fuel installations for diesel.
- ◆ 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 farms have two consumer fuel installations with a permit from the Ministry of Mines and Energy.
- ◆ 9.3 Construction of filling stations or any other facility for the underground and aboveground storage of dangerous goods, including petrol, diesel, liquid petroleum gas or paraffin: The farms have two consumer fuel installations for diesel.

Additional national planning legislation considered include:

- ◆ Harambee Prosperity Plan.
- ◆ 5th National Development Plan (NDP5).

The Harambee Prosperity Plan (HPP) is a targeted action plan to accelerate development in clearly defined priority areas, which lay the basis for attaining prosperity in Namibia. The Plan does not replace, but complements the long-term goal of the National Development Plans (NDPs) and Vision 2030. The rationale behind the HPP is to introduce an element of flexibility in the Namibian planning system by fast tracking development in areas where progress is insufficient. It also incorporates new development opportunities and aims to address challenges that have emerged after the formulation of NDPs. It is the purpose of NDP5 to set out a roadmap for achieving envisioned rapid industrialization while adhering to the four integrated pillars of sustainable development as identified in the plan. Irrigation activities contribute primary to the “Economic Progression” pillar by increasing the volumes of locally produced goods.

One of the focus areas of the economic progression pillar of NDP5 is agriculture and food security. The NDP5 aims to decrease the amount of food insecure individuals, increase food production and increase the share of value addition in crop and livestock farming. Development and operations of irrigation activities on the farm are in line with all of these strategies as identified in the NDP5. The farms contribute to the amount of productive, irrigated land in Namibia, provide employment, produce crops for local and international markets, and produces fodder for livestock farming.

7 ENVIRONMENTAL CHARACTERISTICS

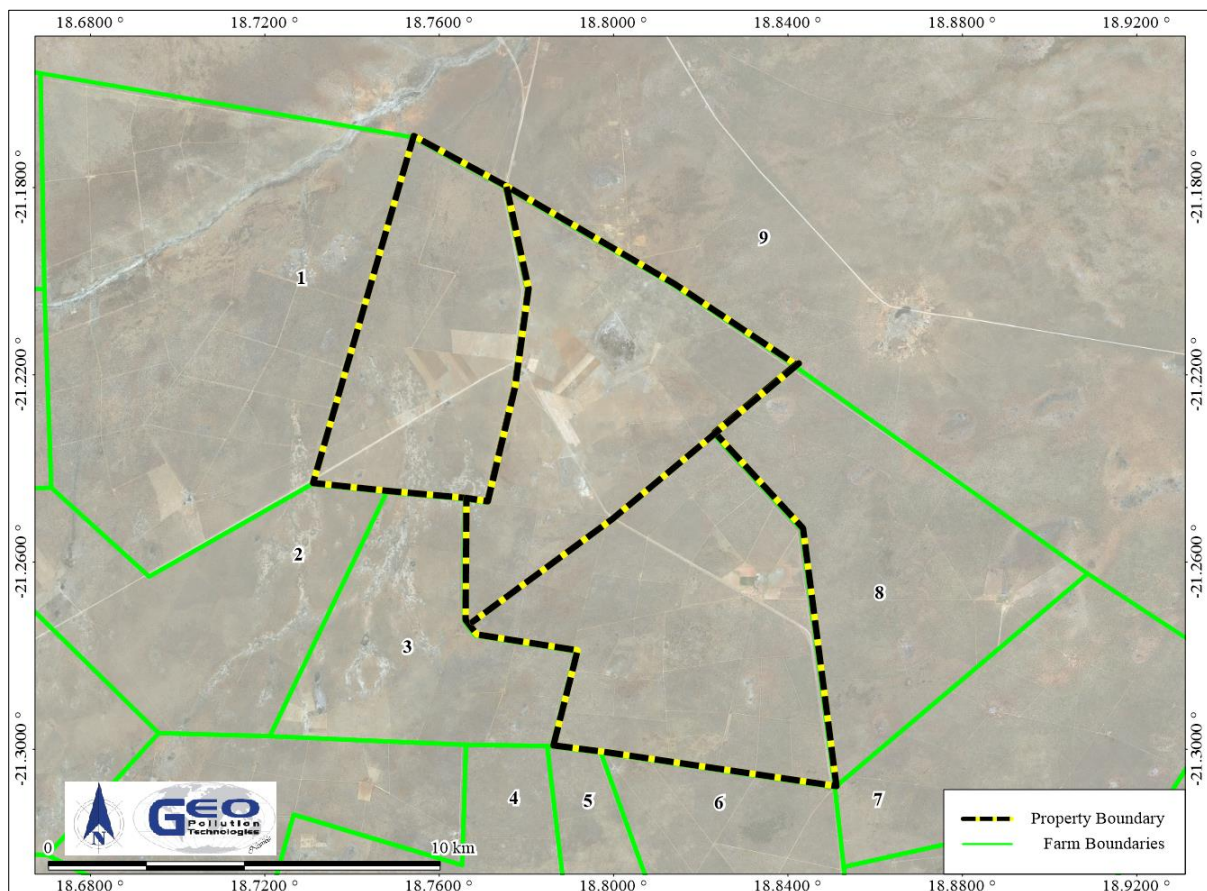
This section lists pertinent environmental characteristics of the study area and provides a statement on the potential environmental impacts on each.

7.1 LOCALITY AND SURROUNDING LAND USE

The farms are located approximately 5 km south of Otjinene centred on 21.21880 °S and 18.77930 °E. They straddle the T1402 (C22) road connecting Gobabis with Otjinene as well as the M0070 (C29) connecting Otjivero with Otjinene. Adjacent properties are farms to the south and west while the north-eastern boundaries borders on communal land. The adjacent properties are listed in the table below and their locations are depicted in Figure 7-1.

Table 7-1. Adjacent properties

Number on Map	Farm Name and/or Number
1	Elandsan FML/00672
2	Vierpanne FML/00670/00REM
3	Magda FML/00670/1/REM
4	Uilpan FML/00731
5	FML/00732
6	Lelievlei GED.1 FML/00694
7	Dis AI FML/00674/00001
8	Bosville FML/00673
9	Communal Area

**Figure 7-1. Properties adjacent to the project area*****Implications and Impacts***

The location is well suited for the agricultural activities. It is already zoned for agricultural use and is situated in an area suitable for irrigation. The farm is further surrounded by activities of similar nature. The farm will follow sustainable agricultural practices ensuring impacts on the surrounding land-users are minimised.

7.2 CLIMATE

Otjinene is situated in the Savanna Biome of Namibia. Due to a relatively uniform landscape, variation in climatic conditions in the Omaheke Region is limited. 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, Table 7-3 and Figure 7-2.

Atlas of Namibia Project data was compiled from almost 300 rainfall stations across Namibia. The data was contoured in 50 mm intervals prior to 1999 for variable length data sets. 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.

The project area is situated in a semi-arid climatic region. Days are mostly warm with very hot days during the summer months, while nights are generally cool. The rain season normally starts in October and last until May, peaking in January and February. Heavier rainfall (single day events) occur between November and March, with a single event of 85.3 mm in April (last 39 years data) being the highest. This is an obvious anomaly with most of the single day maximums being less than 40 mm. The average annual evaporation rate remains high at up to 3,000 mm/a. Table 7-2 contain a summary of the climate conditions for the area.

The average annual rainfall for the last 39 years was calculated as 383 mm/a, with a coefficient of variance of 31 % (Table 7-3). This coefficient of variance seem to correlate with Atlas of Namibia Project data of Table 7-2. Daily and seasonal rainfall data (Funk, et.al 2015) is presented in Figure 7-2. Seasonal (July to June) total rainfall, centred on the average line for the last 39 years, is presented, with the daily total rainfall and the seasonal cumulative rainfall. From the figure it is clear that since 2010 to 2020 six seasons received above average rainfall, namely 2009-2010, 2010-2011, 2011-2012, 2013-2014, 2016-2017 and 2019-2020. The rest were all below average with the driest years (last 39 years data) being 1994-1995, followed by 2018-2019. The rain season 2018-2019 is part of a dry period stretching from June July 2017 until June 2019.

Table 7-2. Summary of climate data for the Otjinene area (Atlas of Namibia Project, 2002)

Variation in annual rainfall (%)	30-40
Average annual evaporation (mm/a)	2,800-3,000
Water deficit (mm/a)	1,501-,700
Temperature (°C)	20-21

Table 7-3. Rainfall statistics (Funk et al., 2015)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum (mm)	14.7	0.0	15.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum (mm)	275.5	205.3	138.3	110.3	12.4	2.1	1.0	0.8	7.6	36.2	97.1	164.4
Average (mm)	86.3	83.3	66.7	32.4	1.3	0.1	0.1	0.1	1.8	11.6	38.1	61.2
Daily maximum (mm)	35.4	38.7	39.6	85.3	12.4	1.0	1.0	0.8	5.6	11.9	19.9	27.8
Average rain days	10	9	6	2	0	0	0	0	1	3	7	8
Season July - June average: 383 mm						Coefficient of variation: 31 %						
Data range	1981-Jul-01 to			2020-Jun-30			Lat: -21.2188°S Long: 18.7793°E					

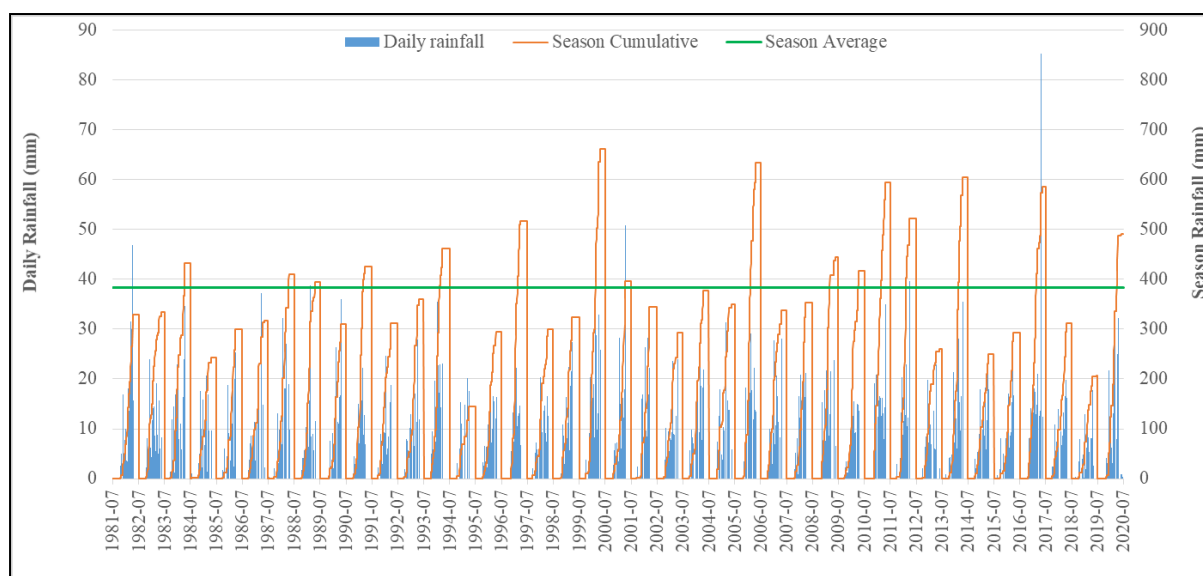


Figure 7-2. Daily and seasonal rainfall (Funk et al., 2015)

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.

The current drought conditions may impact on groundwater availability due to reduced aquifer recharge.

7.3 TOPOGRAPHY, DRAINAGE AND SOILS

The general topography of the project area can be described as relatively flat, with the elevation decreasing towards the east. Regional surface runoff is therefore generally directed toward the east. Due to the flat terrain, drainage is poorly developed in the area.

Regionally, the project falls in the catchment of the Okavango River. Locally, surface runoff collects in the Eiseb River, which is located about 1 km north of the project area. Local drainage is therefore expected towards the north to the Eiseb River. The Eiseb flow towards the Okavango Delta in Botswana connecting with the Otjozondjou River about 80 km east of the border.

A map showing inferred slope and surface drainage directions, as generated from Shuttle Radar Topography Mission (SRTM) 30 m data, can be seen in Figure 7-3. It should be noted that drainage are not as well developed as what the figure might present due to high infiltration rates and flat topography. The slope of the project area is mainly less than 5°. Topography and drainage is discussed in more detail within the hydrogeological specialist report.

The project area forms part of the Kalahari Sandveld landscape known for its palaeo dunes and pans, which can be observed in the larger study area. Longitudinal dunes typically orientated in a west to east direction may occur in the larger region.

The farm is situated within the Kal3-4 agro-ecological zone (AEZ) which is a Kalahari Sands Plateau characterised by stabilized sand drift with few pans. The average growing period is 61 to 90 days and it has a very short dependable growing period. The Kalk3-4 AEZ is ranked 4th in Namibia in terms of agricultural potential and is deemed most suitable for large stock grazing. The availability of groundwater and suitable soils does however allow for crop cultivation.

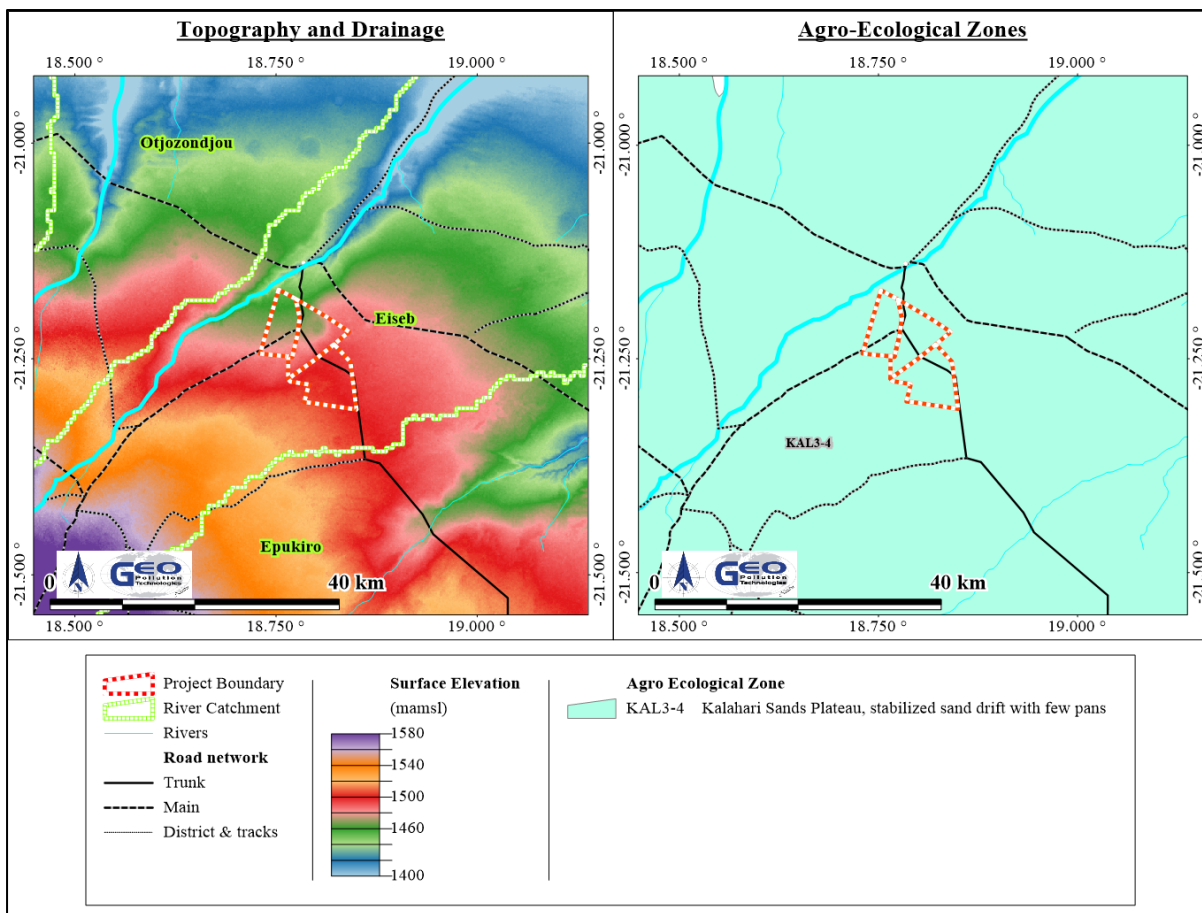


Figure 7-3. Topography, drainage and agro-ecological zones

Almost the entire area covered by the farms has feralic Arenosols with only a small portion in the northern corner of Rika (Portion 1) having eutric Fluvisols. Arenosols can be described as sandy soils with poor capacity to retain nutrients originating from aeolian sand. These soils are common in arid and semi-arid environments and are associated with flat to undulating topography. Landforms associated with Arenosols are typically dunes, sand plains and sand ridges.

Fluvisols are described as well drained, fine to loamy sand. A Fluvisol is associated with flat to almost flat topography in drainage lines or valley bottoms. Its parent material is alluvial deposits. Figure 7-4 indicate the soil and surface geology of the project area. Surface geology is comprise of sand and calcrete.

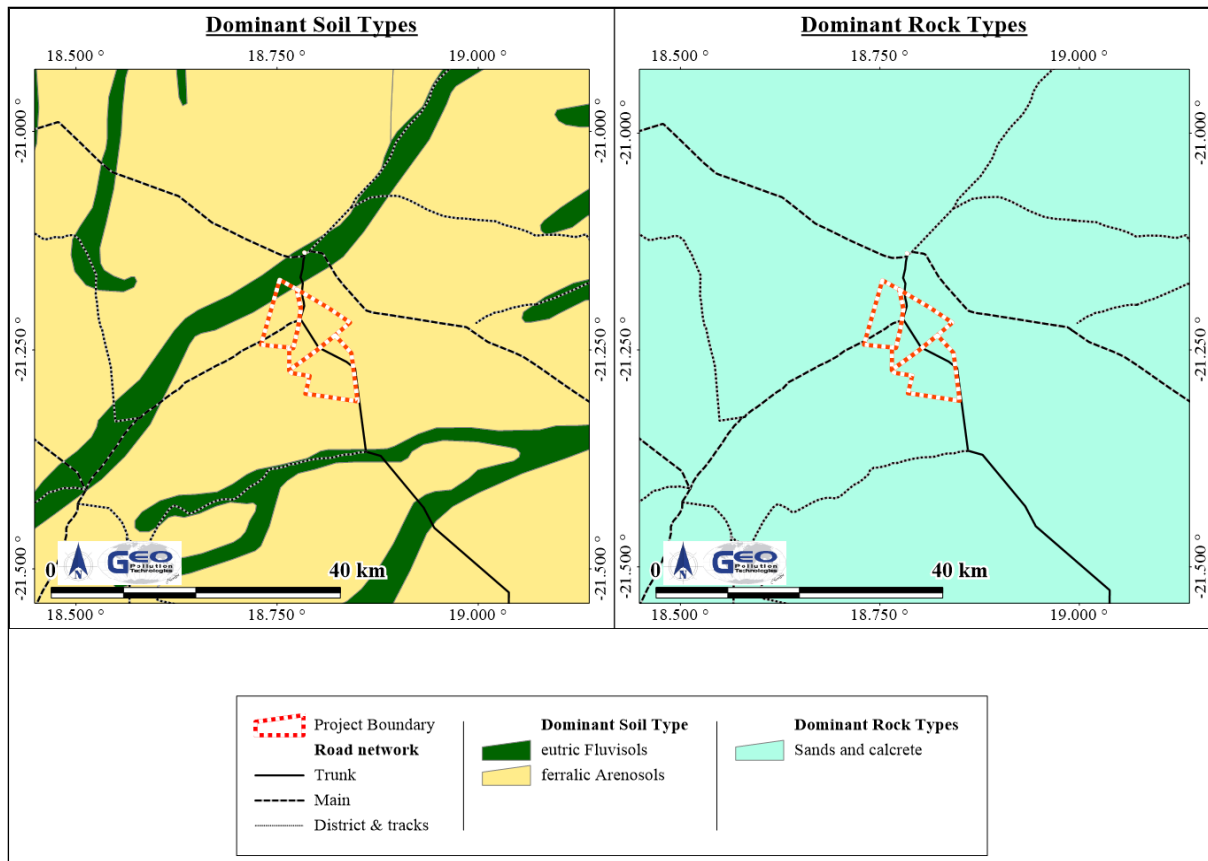


Figure 7-4. Dominant soil and rock types

Implications and Impacts

The lack of major surface runoff and drainage may lead to pooling and even flooding of plains during heavy rainfall events which may negatively impact soil quality and crop production. Irrigation attempts outside of suitable areas may be less productive than alternatives such as livestock farming. This may lead to debushing and habitat destruction ultimately leading to desertification if farming on this land is ceased due to unproductivity. The production of moringa is ideal as a high value crop justifying the abstraction of groundwater for purposes of irrigation.

7.4 GEOLOGY AND HYDROGEOLOGY

The regional stratigraphic succession of the project area can be divided into geology belonging to the Namibian Age (Damara Sequence), Cambrium Age, Triassic Age, Jurassic Age and lastly Late Cretaceous- to Quaternary Age (Kalahari Group). Kalahari Group surficial deposits occur as overburden of varying thickness over hard rock substrata. Rock outcropping is relatively rare and scattered in the project region. Figure 7-5 indicates the dominant geology of the project area and boreholes used for irrigation on the farm, as well as boreholes captured in the DWA database, with their yields.

The Damara Sequence is divided into various tectonostratigraphic zones, the project area being within the Southern Zone, with the Okahandja Lineament or Okahandja Shear Zone being the northern boundary of this Zone, Figure 7-5. The Okahandja Lineament occurs about 45 km to the northwest and runs parallel to another lineament closer to the project, namely the Kudu Lineament, which is about 6 km northeast of the project.

The Southern Zone is characterized as a low temperature-high pressure zone that locally contains formations comprising of schist, graphitic schist, quartzite, marble and calc-silicate of the undifferentiated Nosib and Swakop Groups. Swakop Group granite intrusions also occur in the study area.

Moderate folding of the Damara and Pre-Damara Sequence strata occurred during the Pan African Orogeny (680 - 450 Ma) and resulted in the formation of thrusts, synclines and anticlines. Rocks south of the Okahandja Lineament have isoclinal, overturned and thrust fold structures, which can be extended throughout the Southern Zone. Within the Southern Zone the foliation is mainly northwest-dipping, with a dip angle of 20° to 40° (Goscombe et al., 2017).

A small extent of Cambrian Age geology comprising of serpentinite, chlorite schist and talc schist is mapped on farm Okasondana No. 264 about 20 km to the southeast of the project area.

Triassic- and Jurassic Age Karoo Supergroup rocks occur unconformably as near-horizontal layers over older geology, e.g., Damara Sequence. Omigonde Formation rocks, namely mudstone, siltstone and sandstone, outcrop about 54 km to the east and basalt of the Kalkrand Formation outcrop about 48 km to the northeast of the project.

Late Cretaceous and Quaternary Age Kalahari Group deposits rest unconformably over older pre-Kalahari rock formations and consist of a wide range of terrestrial sediments such as breccia, gravel, sand, carbonate and calcrete deposits. These sediments originate mainly from fluvial deposition with some reworking through aeolian processes. The expected thickness of the surficial deposits at the project area is approximately 50 - 100 m (Klock, 2001).

For more detail on the geology refer to the hydrogeology specialist study conducted for this project.

The farms occur in the Omaheke Groundwater Basin (Figure 7-6). It should be noted that this Groundwater Basin is a management basin and that the actual groundwater basins differ from these boundaries. The project area also fall in the Eiseb - Epukiro Catchment, see Figure 7-6. Groundwater in this catchment generally flows eastward across the Botswana border in the Northern Kalahari/Karoo Basin Transboundary Aquifer system stretching across the Namibian border. The project also fall in the catchment of the Eiseb Graben, which is emplaced about 170 km east-northeast of the project.

Local flow patterns may vary due to groundwater abstraction and due to geological constraints, but the larger scale groundwater flow is expected to be from southwest to northeast toward the Eiseb Graben Aquifer. Local groundwater flow is expected to take place through primary porosity in the surface cover (Kalahari Group), 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 rock formations.

According to the Ministry of Agriculture, Water and Forestry (MAWF; 2006) the project is located outside a water control area. Government therefore do not regulate groundwater usage in this area, e.g., drilling, cleaning or deepening of boreholes and rates of water abstraction. However all groundwater remains property of the government of Namibia. See Figure 7-6 for a map indicating the water control areas relative to the project location.

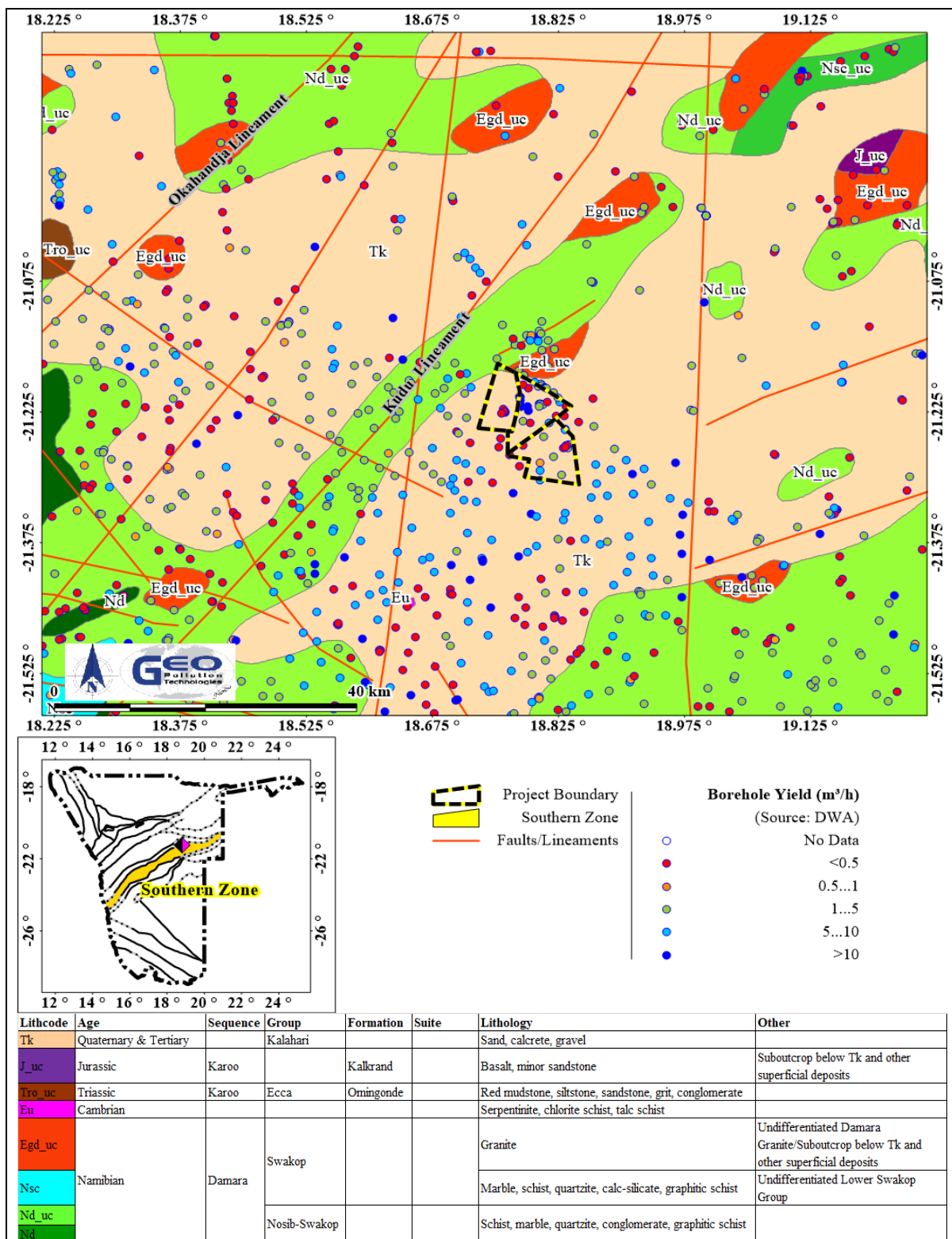


Figure 7-5. Regional geology map (GSN, scale 1:1,000,000)

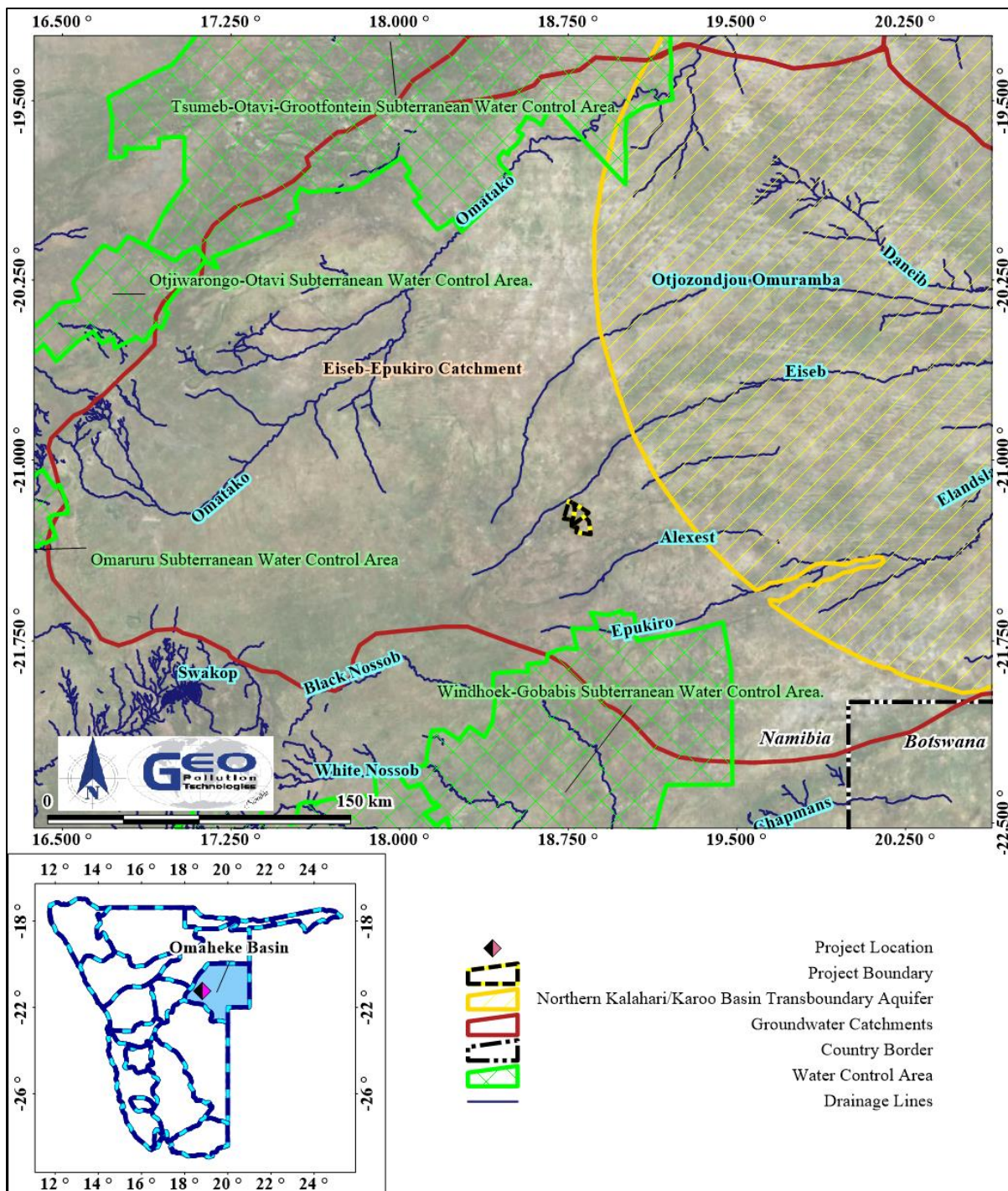



Figure 7-6. Groundwater catchments, water control areas and transboundary aquifer

Table 7-4 indicates the groundwater statistics for a radius of 5 km around the project area. 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. Groundwater is widely utilised in the study area, with a total of 23 boreholes within a 5 km radius. The boreholes were drilled to an average depth of 67 m below surface and yield of up to 16 m³/h. Groundwater quality falls under Group A with some boreholes having elevated levels of nitrates. The Group A category indicates that the water is of an excellent quality, based on the provided parameters.

Table 7-4. Groundwater statistics

Query Centre: Okatambaka; -21.2188°S; 18.7793°E		Query Box Radius: 5.0km										
		NUMBER OF KNOWN BOREHOLES	LATITUDE	LONGITUDE	DEPTH (mbs)	YIELD (m ³ /h)	WATER LEVEL (mbs)	WATER STRIKE (mbs)	TDS (ppm)	SULPHATE (ppm)	NITRATE (ppm)	FLUORIDE (ppm)
Data points		23			15	21	8	15	16	16	16	16
Minimum			-21.173804	18.731032	34	0	7	4	285	5	0	0
Average					67	5	17	17	426	30	8	1
Maximum			-21.263796	18.827568	125	16	25	32	942	53	53	1
Group A					46.67%	14.29%	12.50%	20.00%	100.00%	100.00%	81.25%	100.00%
<i>Limit</i>					50	>10	10	10	1000	200	10	1.5
Group B					20.00%	14.29%	87.50%	80.00%	0.00%	0.00%	6.25%	0.00%
<i>Limit</i>					100	>5	50	50	1500	600	20	2.0
Group C					33.33%	66.67%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<i>Limit</i>					200	>0.5	100	100	2000	1200	40	3.0
Group D					0.00%	4.76%	0.00%	0.00%	0.00%	0.00%	12.50%	0.00%
<i>Limit</i>					>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.

Groundwater quality data is presented in Figure 7-7 as a Maucha Plot. From the figure it is clear that the groundwater of the project location is mostly of a calcium - magnesium - bicarbonate water type which suggest the water is recently recharged. Groundwater to the west and northwest of the project has higher concentrations of magnesium (Mg) and less dominance in calcium (Ca) than the rest of the area. Localised occurrences of water with more dominant sodium (Na), sulphate (SO₄) and chloride (Cl) concentrations are present mainly to the southeast of the project area. In the immediate farm area there seems to be an increase in total dissolved solid content, associated with an increase in the chloride (Cl) concentration.

Implications and Impacts

A risk to groundwater pollution is expected due to the geological sensitivity of the area. 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. The hydrogeological specialist study however indicates that water levels, under current groundwater abstraction rates, are stable.

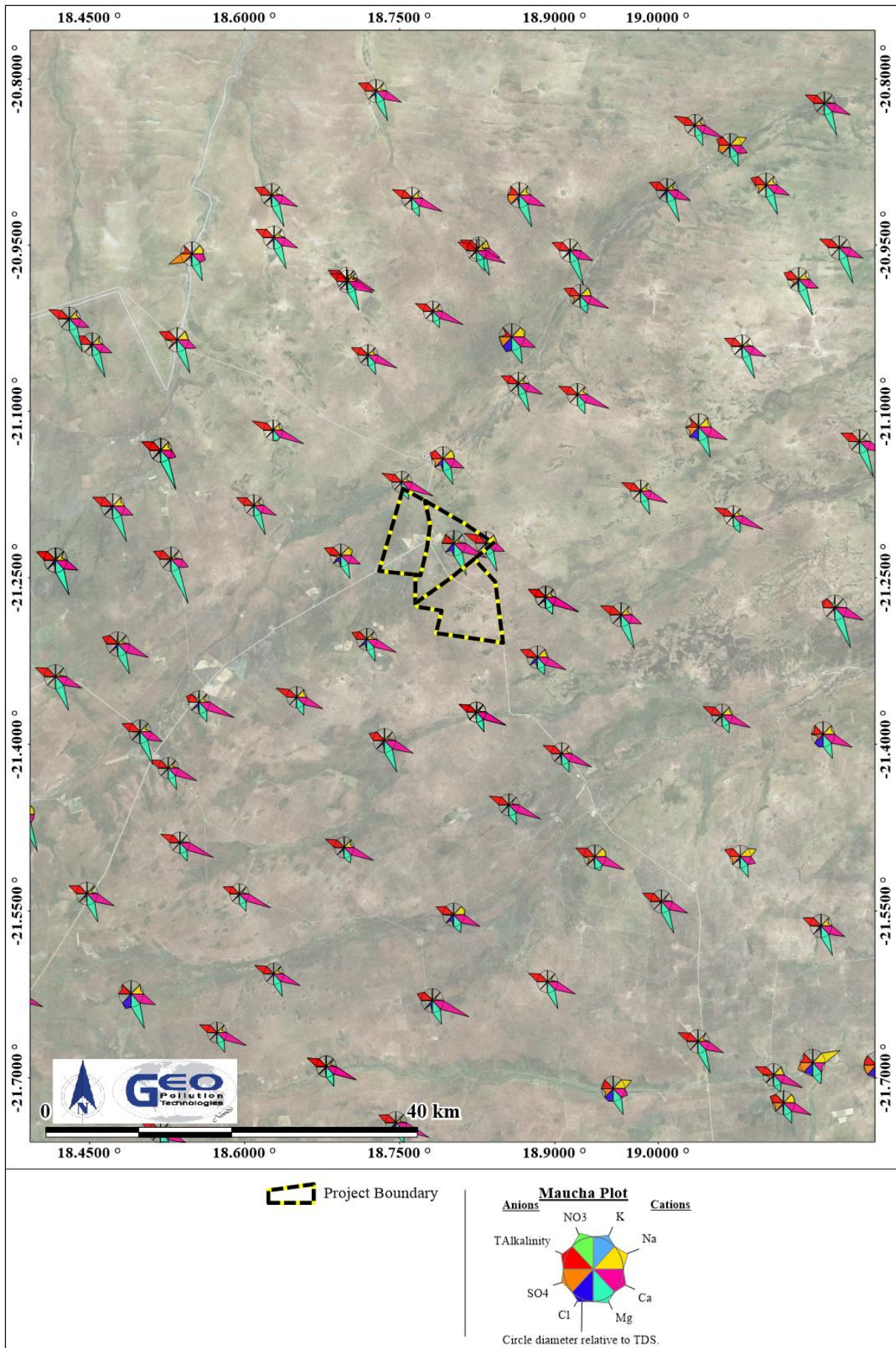


Figure 7-7. Groundwater quality

7.5 PUBLIC WATER SUPPLY

Local communities are completely reliant on groundwater as a source of potable water supply. In the nearby settlement of Otjinene, the Namibia Water Corporation (NamWater) manages water supply, but farm owners supply their own water from various boreholes on their properties. These boreholes tap into the Omaheke groundwater basin, which falls outside of a water control area (permit area).

Implications and Impacts

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

7.6 ECOLOGY

The project location is situated in the Savanna Biome with a Central Kalahari vegetation type and shrubland-woodland mosaic structure (Atlas of Namibia Project, 2002). Vegetation diversity is medium to low with between 100 and 150 plant species (Atlas of Namibia Project, 2002). The most common trees of the Central Kalahari vegetation type are *Acacia erioloba*, *Acacia mellifera*, *Tarchonanthus camphoratus*, *Grewia flava*, *Ozoroa paniculosa* and *Acacia hebeclada*. Low vegetation diversity is linked to lower animal diversity (Table 7-5), and for both the level of endemism is low. Based on the combined known endemism of selected higher taxa, not more than six endemic species are expected (Figure 7-8). The farms span three quarter degrees namely 2118BA, 2118BB and 2118BD. An inventory of trees present in these quarter degrees are presented in Appendix C and those with protected status or conservation concerns are presented in Table 7-6. A total of 37 species of trees have been identified to occur in the area and five of these are specifically protected by forestry legislation (Curtis & Mannheimer, 2005). Three species have invasive tendencies typically associated with irresponsible land use practises such as overgrazing.

Animal biodiversity inventories in Namibia are mostly focussed on vertebrates with stronger focus on mammals, reptiles and birds. Furthermore, inventories of animals are often associated with specific areas of interest or frequently travelled roads. Limited detailed information is available for the project area. Mammals of particular importance that may be encountered here include cheetah (*Acinonyx jubatus*), Aardwolf (*Proteles cristatus*), leopard (*Panthera pardus*) bat-eared fox (*Otocyon megalotis*) honey badger (*Mellivora capensis*) African wild dog (*Lycan pictus*) and brown hyaena (*Hyaena brunnea*). Birds like the Lappet-faced vulture (*Torgos tracheliotus*), White-backed vulture (*Gyps africanus*), African spoonbill (*Platalea alba*) and Secretary bird (*Sagittarius serpentarius*) may be present in the area. A number of these mammals and birds are listed as threatened by extinction by the IUCN and include cheetahs, leopards and secretary birds (vulnerable), brown hyaena (near threatened), African wild dog, Lappet-faced vulture (endangered) and white-backed vulture (critically endangered) (IUCN, 2020).

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

Mammal Diversity	61 - 75 Species
Rodent Diversity	20 - 23 Species
Bird Diversity	81 - 110 Species
Reptile Diversity	61 - 70 Species
Snake Diversity	30 - 34 Species
Lizard Diversity	24 - 27 Species
Frog Diversity	8 - 11 Species
Termite Diversity	7 - 9 Genera
Scorpion Diversity	6 - 9 Species

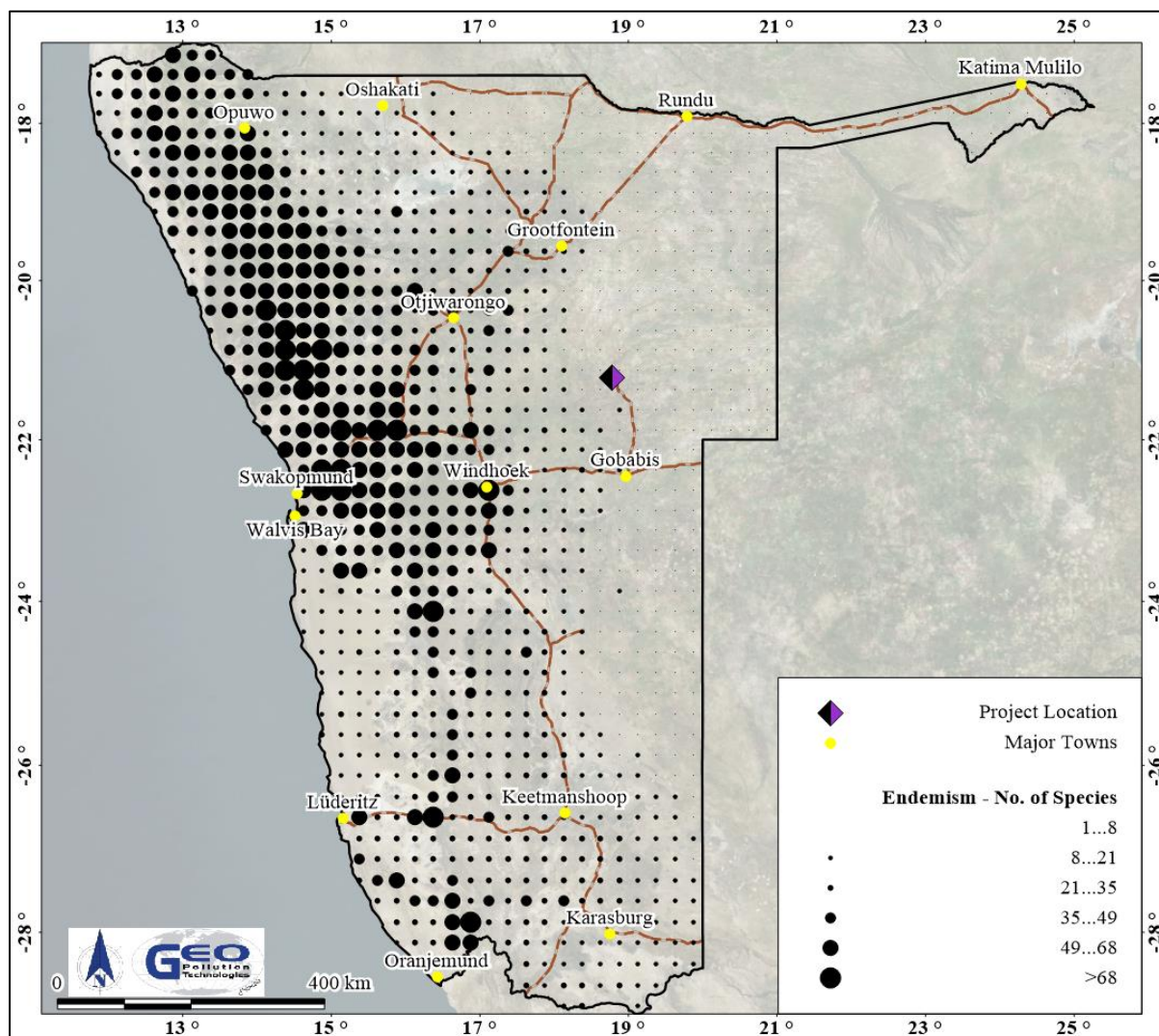


Figure 7-8. Combined higher taxa endemism in Namibia (Atlas of Namibia Project, 2002)

Table 7-6. Trees with conservation concerns in quarter degree squares 2118BA, 2118BB and 2118BD (Curtis & Mannheimer, 2005)

Name	Common Name	Conservation Concerns
<i>Acacia erioloba</i>	Camel-thorn	Protected by forestry legislation
<i>Acacia mellifera</i> subsp <i>detinens</i>	Blue-thorn Acacia	Aggressive invasive
<i>Albizia anthelmintica</i>	Worm-cure Albizia; Aru	Protected by forestry legislation. Seeming low recruitment success.
<i>Boscia albitrunca</i>	Shepherd's Tree	Utilised extensively by people and animals. Seedlings have difficulty establishing. Protected by forestry legislation.
<i>Burkea africana</i>	Burkea	Threatened by fire and overharvesting. Protected by forestry legislation.
<i>Catophractes alexandri</i>	Trumpet-thorn; Rattlepod	Invasive tendency in some locations
<i>Dichrostachys cinerea</i> subsp <i>africana</i>	Kalahari Christmas Tree; Sickle-bush	Invasive tendency in large areas
<i>Ziziphus mucronata</i>	Buffalo-thorn	Protected by forestry legislation

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<i>Dichrostachys cinerea</i> subsp <i>africana</i>	Kalahari Christmas Tree; Sickle-bush	Invasive tendency in large areas
<i>Ziziphus mucronata</i>	Buffalo-thorn	Protected by forestry legislation

Implications and Impacts

Agricultural activities of the Proponent have long been established. 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. Irresponsible use of pesticides to kill vermin such as jackal may further impact on already threatened vulture populations as well as other scavengers. Pesticides may also magnify (biomagnification) in higher trophic levels, especially top predators. This may lead to reproductive and other physiological defects and ultimately declining populations. Over-abstraction of groundwater may lead to ecosystem changes as groundwater levels decrease. Deep rooted terrestrial plants dependent on groundwater will dry out and eventually die.

7.7 DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS

The project area is located in the Okorukambe Constituency of the Omaheke Region. Located close to the border of the Otjinene Constituency, the majority of the seasonal labour force is sourced from the nearby Otjinene settlement. Otjinene had an urban population of approximately 2102 people in 2011 (Namibia Statistics Agency, 2011). The average growth rate for Namibia for the last 10 years has been 1.8%, therefore the estimated population of Otjinene is now approximately 2140. The settlement is also the district capital (of the Otjinene Constituency) in the Omaheke Region. For demographic information of the 2011 population and housing census, refer to Table 7-7 (Namibia Statistics Agency, 2011) which includes the details for the Okorukambe- and Otjinene Constituency in relation to the National and regional averages.

The two constituencies have similar revenue streams. The Okorukambe Constituency however has 65% of employment in the agricultural sector compared to Otjinene Constituency's 60%. The economy of the area relies largely on commercial livestock farming supplemented with crop production and charcoal manufacturing. Unemployment in the Otjinene Constituency is very high at 48.9% while Okorukambe Constituency's is lower at 29%. Livelihoods in the constituency are mainly dependent on farming, wages and salaries from employment, and business ventures (not farming).

Table 7-7. Demographic characteristics of the Okorukambe- and Otjinene Constituency, the Omaheke Region and Nationally (Namibia Statistics Agency, 2011)

	Okorukambe Constituency	Otjinene Constituency	Omaheke Region	Namibia
Population (Males)	5,498	3,818	37,217	1,021,912
Population (Females)	4,562	3,488	34,016	1,091,165
Population (Total)	10,060	7,306	71,233	2,113,077
Population density (people/km²)	0.5	0.6	0.8	2.6
Unemployment (15+ years)	29%	49%	40%	37%
Literacy (15+ years)	65%	74%	73%	89%

Table 7-8. Main industry of employed population aged 15 years and above for the Okorukambe- and Otjinene Constituency and Omaheke Region

Main industry	Omaheke Region	Otjinene Constituency	Okorukambe Constituency
Total	17,048	1,358	3,225
Agriculture Forestry and Fishing	7,692	821	2,096
Construction	1,236	45	289
Administrative and Support Service Activities	1,457	76	195
Public Administration and Defence; Activities of Private Households	1,013	29	40
	1,145	69	167

The farming unit as a whole provide for a variety of employment opportunities. Although charcoal production is considered to use unskilled labour, some experience sharing is required to any person wanting to be employed in the sector. Similarly, skills and training are required to maintain and operate the irrigation systems. The cultivation and processing of moringa is a unique and pioneering enterprise in Namibia. Skills and training related thereto are required from cultivation to marketing of the product to international markets. The farming unit as a whole provide 40 permanent and 150 seasonal job opportunities of which a portion receives training.

Implications and Impacts

Operations on the farm sustain valuable full time as well as seasonal employment opportunities in a constituency that has a high unemployment rate. Some skills development and training also benefit employees during the operational phase.

7.8 CULTURAL, HERITAGE AND ARCHAEOLOGICAL ASPECTS

There are no cultural, heritage or archaeological aspects known to be present on the farm.

Implications and Impacts

No implications or expected impacts.

8 PUBLIC CONSULTATION

Consultation with the public forms an integral component of an environmental assessment investigation and 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 projects and to identify additional issues that they feel should be addressed in the environmental assessment.

Public participation notices were advertised, twice in two weeks, in the national papers: The notices appeared in the *Republikein* and the *Namibian Sun* on 05 and 12 August 2020. A site notice was placed

on site and notification letters were e-mailed to neighbours as well as the local farmers union. See Appendix C for proof of the public participation processes and registered IAPs. A number of IAPs registered, but comments were only received from on such IAP and the comments are detailed in the issues and responses report (Appendix D).

9 MAJOR IDENTIFIED IMPACTS

During the scoping exercise, a number of potential environmental impacts were identified. 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 pollution 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.

9.2 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 conducted in a sensible way to prevent impacts 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 relatively 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 dependant on the abstracted groundwater.

Typical consequences of over abstraction will include a lowering in the water table. Lowering of water table may further lead to the drying up of boreholes and springs. Vegetation will also be impacted where such vegetation has access to groundwater. It is important to note that the groundwater basin forms a transboundary aquifer that extent from Namibia into Botswana. Over abstraction in any of the countries will have a negative impact on the other countries and can causes disputes. As the groundwater flows from the recharge area in Namibia, out to Botswana, care must be taken in Namibia to ensure that the quality of water is not affected as this will later on affect the neighbouring country.

Based on current water usage data and water level fluctuations in the area, as indicated in the hydrogeological specialist report, groundwater levels are deemed stable. However, a short term threshold of 5 m below the average rest water level is set from where abstraction rates should be reduced.

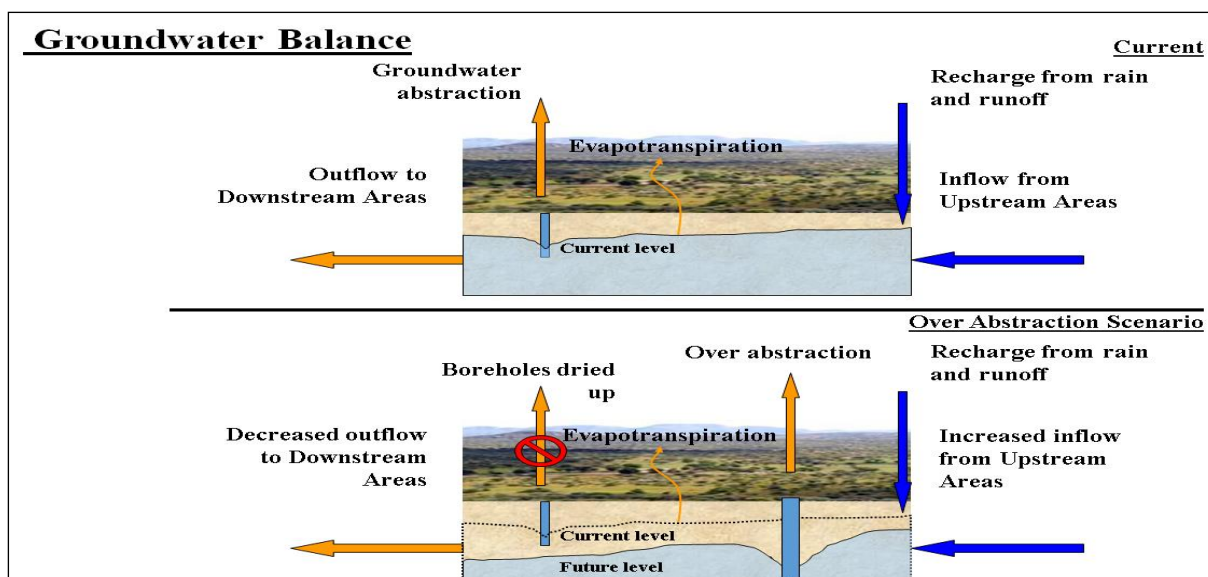


Figure 9-1. Conceptual groundwater balance with over abstraction scenario

9.3 FIRE

A risk of veld fires exist. Charcoal production in kilns close to dry vegetation, or charcoal that has not cooled down sufficiently, may cause fires. 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

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 national roads passing through the farms 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, charcoal and cattle to markets. Since it is an existing operation, traffic impacts related to the activities on the farm will remain the same, and no additional impacts are expected.

9.6 HEALTH AND SAFETY

Injuries related to working with machinery (e.g. moving parts), 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, or during movement of machinery like tractors on the farm, can occur. Venomous animals like snakes, scorpions and spiders may be present.

9.7 ECOSYSTEM AND BIODIVERSITY IMPACT

No additional land clearing is foreseen for irrigation fields in the near future. Indiscriminate harvesting of trees for wood and charcoal production may impact on protected and/or sensitive species. It may further result in damaging of nests of birds where these are present in such trees. 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. Irresponsible pesticide use may negatively impact ecology in the short and long term.

9.8 SOCIO-ECONOMIC IMPACTS

The project contribute to food security at a national level and contribute towards a positive trade balance by exporting high value moringa. Permanent employees and seasonal employees work on the farm. Housing and amenities are available to permanent employees and their families. Proper sanitation facilities are present for all workers.

Existing and planned developments typically entice jobseekers to migrate to the area. This may lead to high levels of unemployment and its associated social ills. 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 that are expected from the operational, construction, care and maintenance, and potential decommissioning activities of the farm. An EMP based on these identified impacts is present in this section.

For each impact, an environmental classification was determined based on an adapted version of the Rapid Impact Assessment Method (Pastakia, 1998). Assessment of impacts is 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:

$$\text{Environmental classification} = A1 \times A2 \times (B1 + B2 + B3)$$

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 on the farm 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 execution of various activities on the farm. This section of the report is also presented as a stand-alone document for easy reference. All personnel taking part in the operations of the farms 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 possible construction activities of the farms;
- ◆ to prescribe the best practicable control methods to lessen the environmental impacts associated with the farms;
- ◆ 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 and biodiversity/ecological impacts.

10.1.1 Planning

During the phases of planning for the operations, maintenance/construction and decommissioning phases of the farms, 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 all other phases of the project:

- ◆ Ensure that all the necessary permits from the various ministries, local authorities and any other bodies that governs the operations, maintenance/construction and decommissioning activities on the farms remain valid. These include the consumer fuel installation certificate and water abstraction and tree harvesting 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 (HSE) Coordinator to implement the EMP and oversee occupational health and safety as well as general environmental related compliance.
- ◆ 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 plan, emergency response plan and HSE manuals;
 - Adequate protection and indemnity insurance cover for incidents;
 - Procedures, equipment and materials required for emergencies (e.g. firefighting, first aid, etc.).
- ◆ Establish and maintain a fund for future ecological restoration, specifically for instances of environmental damage caused during operations including pollution remediation where required. Should project activities cease completely, and future land-use will not involve agriculture, the funds should be utilised to remove all redundant infrastructure and waste.
- ◆ 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 environmental assessment and EMP and apply for renewal of the environmental clearance certificate prior to expiry.

10.1.2 Skills and Development

During the operations and maintenance/construction phases, some training is provided to a portion of the workforce, to allow them to conduct certain tasks according to the required standards. Training include safety and technical aspects. Skills are transferred to an unskilled workforce for general tasks and charcoal and moringa production. Development of people and technology are key to economic development and the success of operations. 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	3	1	12	2	Probable
Daily Operations	Employment and transfer of skills	2	1	2	3	2	14	2	Definite
Indirect Impacts	Employment and transfer of skills in Namibia's agricultural sector	2	1	2	3	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

Enhancement:

- ◆ 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 of employees.
- ◆ Inform employees about parameters and requirements for references upon employment.
- ◆ Provide managerial references for unofficial training or skills transfer.
- ◆ Employ best practise as stipulated in the Forestry and Environmental Guidelines for Bush Harvesting Projects

Responsible Body:

- ◆ Proponent
- ◆ Contractors

Data Sources and Monitoring:

- ◆ Keep records of all training provided to employees.
- ◆ 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.

10.1.3 Revenue Generation and Employment

Skilled and unskilled labour are required for the operations and maintenance/construction activities associated with the farms. Livelihoods are thus sustained and the spending power of the local community increased. Revenue is generated through the sale of products (maize, moringa, cattle, wood and charcoal) 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	Definite
Daily Operations	Employment contribution to local and national economy	2	1	3	3	1	14	2	Definite
Indirect Impacts	Decrease in unemployment, contribution to local economy	3	1	3	3	3	27	3	Definite

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

Actions

Enhancement:

- ◆ The proponent must employ local Namibians where possible.
- ◆ If the skills exist locally, employees must first be sourced from the area, 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.

10.1.4 Demographic Profile and Community Health

Farming activities relies on labour. Jobseekers migrating to the Otjinene area may lead to increased unemployment and expansion of informal settlements. Here, factors such as communicable disease like HIV/AIDS as well as alcoholism and 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. It is however not foreseen that the project will result in significant migration to the Otjinene settlement within the communal area.

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	1	1	2	-8	-1	Probable
Daily Operations	Social ills possibly associated with staff and jobseekers	2	-1	1	2	2	-10	-2	Probable
Indirect Impacts	The spread of disease	2	-1	2	2	2	-12	-2	Improbable

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

Actions:

Prevention:

- ◆ Appointment of reputable contractors where applicable.
- ◆ Adhere to all local authority by-laws relating to environmental health, which includes, but is not limited to, sanitation requirements for employees.
- ◆ 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.

10.1.5 Agricultural Produce and Economic Diversification

The project is in line with the objectives of 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. Production of high value moringa for export to international markets diversifies the Namibian economy.

Project Activity/Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Construction and Daily Operations	Contribution to economy, contribution to food security in Namibia	3	1	3	3	2	24	3	Definite
Indirect Impacts	Reduced import needs, increase in trade balance, spread of knowledge and skills, increased crop productivity	3	1	3	3	3	27	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 exporting high value products.

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.

10.1.6 Traffic

The C22 and C29 national roads pass through the farms. Potential traffic impacts are mainly related to farm vehicles using the roads to access various locations on the farms as well as the transport of employees and goods to and from the farms. The turnoffs from the main road to the farms are the key sections of concern. As this is an existing operation, an increase in traffic impacts is expected to be unlikely in the near future. The farms have public roads across them, enhancing the potential security risk related to poaching and farm attacks.

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	1	-1	2	2	1	-5	-1	Improbable
Daily Operations	Increased traffic, road wear and tear and accidents	1	-1	2	2	1	-4	-1	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 farms' turnoffs 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.
- ◆ All turnoffs from the main road should be registered with the Roads Authority of Namibia.

Mitigation:

- ◆ Traffic management should be performed if any traffic impacts are expected on the national roads.

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.

10.1.7 Health, Safety and Security

Daily operational and intermittent maintenance and construction activities on the farm are reliant on human labour. Such activities have varying degrees of health and safety risks. Examples include the operation of vehicles and machinery with moving parts, such as harvesters and wood saws, and the handling of hazardous chemicals with inherent health hazards, such as pesticides and fuel, when ingested, inhaled or physical contact occur. Encounters with wild animals, and especially venomous species like snakes, may pose risks to employees. Security risks relates to unauthorized entry on the farms, 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	3	3	1	-14	-2	Probable
Daily Operations	Physical injuries, exposure to chemicals and criminal activities	1	-2	3	3	2	-16	-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.
- ◆ 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.
- ◆ Implement a maintenance register for all equipment whose malfunction can lead to injury or exposure to hazardous substances.
- ◆ Apply and adhere to all industry specific health and safety procedures and regulations applicable to the handling of food produce for markets.

Mitigation:

- ◆ 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.

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.

10.1.8 Fire

Construction activities, failing electrical infrastructure, charcoal production 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 natural 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	2	2	1	-20	-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 (safe operational procedures, firefighting, fire prevention and responsible housekeeping practices).
- ◆ Ensure all flammable chemicals are stored according to material safety data sheet (MSDS) and SANS instructions and all spills or leaks are cleaned immediately.
- ◆ Maintain regular site, mechanical and electrical inspections and maintenance.
- ◆ Maintain firefighting equipment and promote good housekeeping.
- ◆ Clean and maintain firebreaks at strategic locations on the properties, especially where charcoal is manufactured.
- ◆ Notify the farmers' association as well as all surrounding farmers if planned burns (e.g. to create firebreaks) are planned.
- ◆ Allow fires used for purposes such as cooking (by staff) in designated areas only.

Mitigation:

- ◆ Implement the fire protection and firefighting 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 firefighting equipment were tested and training given.

10.1.9 Noise

Noise is generated by various operational and possible construction activities. Machinery like wood saws, vehicles and harvesters cause elevated noise levels that may result in hearing impairment after long term exposure. Activities are generally remote from receptors other than the Proponent, his employees and their families residing on the farms. The nature of the noise is related mainly to the charcoal and wood operations typically on a farm.

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	-1	2	2	1	-10	-1	Probable
Daily Operations	Noise generated from the operational activities – nuisance and hearing loss	1	-1	2	2	1	-10	-1	Definite

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

Actions

Prevention:

- ◆ Follow World Health Organization (WHO) guidelines on maximum noise levels (Guidelines for Community Noise, 1999) to prevent hearing impairment.
- ◆ Regularly service all machinery 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:

- ◆ WHO Guidelines.
- ◆ Maintain a complaints register.
- ◆ Bi-annual report on complaints and actions taken to address complaints and prevent future occurrences.

10.1.10 Waste Production

Various waste streams result from the operational and possible construction and maintenance activities. 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 residents and employees on the farm. Waste presents a contamination risk and when not removed regularly may become a health and/or fire hazard and attract wild animals and scavengers. Sewage is a form of liquid biological waste that needs disposal.

Since no official waste disposal facilities, especially for hazardous waste, are available, all waste that cannot be re-used are burned at dedicated waste sites.

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	2	2	2	-12	-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.
- ◆ Educate employees on the importance of proper waste handling and disposal.

Mitigation:

- ◆ Alternative waste disposal methods should be investigated for hazardous waste or waste that present specific pollution risks. This include transporting such wastes to recyclers in Windhoek when empty trucks travel there to collect goods.
- ◆ Discarded waste should be disposed of and burned regularly at a dedicated site to reduce health and pollution risks.
- ◆ Empty chemical containers that may present a contamination/health risk must be treated as hazardous waste. Workers should not be allowed to collect such containers for purposes of storing water or food. This can be achieved by puncturing or crushing such containers prior to disposal.
- ◆ Ensure all ablution facilities are connected to properly constructed septic tank systems to prevent groundwater contamination.

Responsible Body:

- ◆ Proponent
- ◆ Contractors

Data Sources and Monitoring:

- ◆ Maintain a register of disposal of hazardous waste. 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.

10.1.11 Ecosystem and Biodiversity Impact

Agriculture and related activities are ongoing at the farms and no expansion is foreseen in the nearby future. No further impacts on vegetation are thus expected from additional land clearing. Pollution of the environment may however impact on the ecosystem and biodiversity. Poaching and illegal collection of plant and animal materials may occur. Indiscriminate harvesting of trees for wood and charcoal production may lead to the destruction of protected or rare species. Bird nests may be destroyed during tree harvesting. 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	3	2	2	-14	-2	Probable
Daily Operations	Impact on fauna and flora. Loss of biodiversity – poaching, poisoning, etc.	2	-1	2	2	2	-12	-2	Probable

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

Actions.

Prevention:

- ◆ Ensure the necessary wood harvesting permits remain valid. Such permits are now issued by the Directorate of Forestry, Ministry of Environment, Forestry and Tourism.
- ◆ Adhere to the regulations of the Forest Act which includes, but is not limited to:
 - Trees with stem diameter of more than 18 cm at ground level may not be removed unless special approval is granted.
 - No protected species may be removed unless special permission is granted.
 - Licence owner must execute proper supervision over the operations.
 - The harvesting licence must be available at all times for inspection purposes.
- ◆ Wood harvesters to be educated on the tree species and maximum sizes to be harvested. Where wood is sourced from third parties, only wood that conform to licence and Forestry Act conditions should be accepted.
- ◆ Strictly adhere to pesticide application instructions and use pesticides only for the purposes for which it is registered and marketed. Importantly, pesticides should not be used to kill vermin unless specifically registered for that purpose, and even then alternative, environmentally friendly methods should be investigated and used.
- ◆ Prevent pesticides from ending up in the hands of potential poachers.
- ◆ Educate all contracted and permanent employees on the value of biodiversity and strict conditions prohibiting harvesting and poaching of fauna and flora must be part of employment contracts. Include prohibitions or regulations on the collection of firewood.
- ◆ Regular inspection of fences, game footpaths and other sites for snares, traps or any other illegal activities.
- ◆ 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.

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, Forestry 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.
- ◆ Take disciplinary action against any employees failing to comply with contractual conditions related to poaching and the environment.

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.

10.1.12 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.

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, pesticides, herbicides, etc. Sewerage system malfunction.	2	-1	2	2	1	-10	-2	Improbable

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.
- ◆ 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, including any polluted soil or water.

Mitigation:

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

Responsible Body:

- ◆ Proponent
- ◆ Contractors

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 Proponent 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.

10.1.13 Groundwater Abstraction

The over abstraction of groundwater for irrigation and other activities may lead to declining water levels. This may negatively impact on surrounding users as well as existing habitats that depend on groundwater. For example the availability of groundwater may have an impact on the farm and surrounding farms, as well at a wider spatial scale due to the cumulative impact. Over abstraction of groundwater by surrounding users may contribute to the decline in water levels (cumulative impact). It is important to note that the groundwater basin forms a transboundary aquifer that extent from Namibia into Botswana. Over abstraction in any of the countries will have a negative impact on the other countries and can causes disputes.

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	2	2	2	-24	-3	Probable

Desired Outcome: To utilise the groundwater sustainably.

Actions

Prevention:

- ◆ Spread the water abstraction points over a larger area to diffuse the impact.
- ◆ Monthly water level monitoring.

Mitigation:

- ◆ Reduce abstraction when the water levels nears 5 m below the average rest water level of each borehole.

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 summary report on all monitoring results must be prepared.

10.1.14 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. This impact that not only affects the aesthetic appearance, but also the integrity of the farm related infrastructure.

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	2	2	2	-6	-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.

10.1.15 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. Furthermore, collective, indiscriminate wood harvesting in the area may negatively impact ecological functioning. 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 Omaheke 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
Daily Construction and Operations (Negative)	Waste production, pollution, etc.	2	-1	2	2	1	-10	-2	Probable
Daily Construction and Operations (Positive)	The build-up of minor impacts to become more significant Employment, skills development, revenue generation	2	1	2	2	1	10	2	Definite

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.
- ◆ Reviewing biannual 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.

Responsible Body:

- ◆ Proponent

Data Sources and Monitoring:

- ◆ Create a summary report based on all other impacts to give an overall assessment of the impacts of the operational phase.

10.2 DECOMMISSIONING AND REHABILITATION

Closure and decommissioning of agricultural and related activities on the farms as a whole is not foreseen during the validity of the environmental clearance certificate or in the near 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 of infrastructure. Future land use after decommissioning should be assessed prior to decommissioning and rehabilitation initiated if the land would not be used for future purposes. Should decommissioning occur at any stage, rehabilitation of the area may be required. Decommissioning will entail the complete removal of all infrastructure including buildings and irrigation infrastructure. Any pollution present on the site must be remediated. The impacts associated with this phase include noise and waste production as structures are dismantled. Noise must be kept within WHO standards. Waste should be contained and disposed of at a dedicated waste disposal site and not dumped in the surrounding areas. The EMP for the farms 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 and related activities as performed on the farms Okatombaka no. 266, Bosville Wes no. 755 and Portion 1 (Rika) of Farm Okatombaka no. 266, contributes positively to the economy of Namibia. Food and fodder is produced for national markets while moringa, wood and charcoal are produced for both local and international markets. A significant number of employment opportunities are sustained and skills development within the local workforce occur. Revenue is generated that contributes to the Namibian economy.

Negative impacts associated with operational and intermittent maintenance and construction activities on the farm, as summarised in Table 11-1, can successfully be mitigated. Implementing a HSE policy will contribute to effective management procedures to prevent and mitigate impacts. All regulations relating to the agricultural and related activities of the Proponent, including health and safety legislation, should be adhered to and implemented where applicable. Groundwater and soil pollution must be prevented at all times. Fire prevention should be key, fire response plans in place, and regular firefighting training provided to key employees. All staff must be made aware of the importance of biodiversity and the poaching or illegal harvesting of animal and plant products prohibited. This includes the proper handling and correct application of pesticides. Any waste produced must be properly disposed, re-used, or recycled where possible.

The EMP (Section 10) should be used as an on-site reference document for the operations of the farms. 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 Environmental Management System in conjunction with the EMP. All operational personnel must be taught the contents of these documents.

Should the Directorate of Environmental Affairs (DEA) agree 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 assessment process's aim is not to stop the farming activities, or any of its components, but to rather determine its impact and guide sustainable and responsible development as per the spirit of the EMA.

Table 11-1. Impact summary class values

Impact Category	Impact Type	Construction		Operations	
<i>Positive Rating Scale: Maximum Value</i>		5		5	
<i>Negative Rating Scale: Maximum Value</i>			-5		-5
EO	Skills and Development	2		2	
EO	Revenue Generation and Employment	2		2	
SC	Demographic Profile and Community Health		-1		-2
EO	Agricultural Produce and Economic Diversification		3		
SC	Traffic		-1		-1
SC	Health, Safety and Security		-2		-2
PC	Fire		-3		-3
PC	Noise		-1		-1
PC	Waste Production		-2		-2
BE	Ecosystem and Biodiversity Impact		-2		-2
PC	Groundwater, Surface Water and Soil Contamination		-2		-2
BE/EO	Groundwater Abstraction				-3
SC	Visual Impact		-1		-1
	Cumulative Impact (negative)		-2		-2
	Cumulative Impact (positive)		2		2

BE = Biological/Ecological EO = Economical/Operational PC = Physical/Chemical SC = Sociological/Cultural

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Appendix A: Drilling and Water Abstraction Permit



REPUBLIC OF NAMIBIA

MINISTRY OF AGRICULTURE, WATER AND FORESTRY

Telephone: (061) 2087111
Fax: (061) 2087697
Enquiries: E Coetzee
Reference: PL 266 & 677

Department of Water Affairs
Private Bag 13193
Windhoek
9000

Mr O M Steyn
P. O. Box 900
GOBABIS

Sir

APPLICATION FOR A PERMIT FOR THE DRILLING OF FOUR BOREHOLES AS WELL AS FOR THE AUTHORIZATION OF THREE EXISTING BOREHOLES TO ABSTRACT WATER FOR IRRIGATION PURPOSES ON THE FARM OKATOMBAKA NO. 266, GOBABIS DISTRICT

1. The above-mentioned application has been approved. Attached please find permit number 11 274 which authorizes the drilling and authorization of the boreholes concerned for irrigation purposes.
2. You are kindly requested to comply with all the permit conditions, especially condition number 8.

Yours faithfully


PERMANENT SECRETARY



All official correspondence must be addressed to the Permanent Secretary.



REPUBLIC OF NAMIBIA

MINISTRY OF AGRICULTURE, WATER AND FORESTRY

Telephone:	(061) 2087111	Department of Water Affairs
Fax:	(061) 2087697	Private Bag 13193
Enquiries:	E Coetzee	Windhoek
Reference:	PL 266 & 677	9000

PERMIT NUMBER: 11 274

DATE : 19 May 2017

PERMIT ISSUED IN TERMS OF REGULATIONS 5 AND 9 OF GOVERNMENT NOTICE R1278 OF 23 JULY 1971 AS PROMULGATED UNDER SECTION 30(2) OF THE WATER ACT, 1956 (ACT 54 OF 1956), AS AMENDED

NAME OF PERMIT HOLDER	:	Mr O M Steyn
ADDRESS	:	P. O. Box 900, Gobabis
REGISTERED PROPERTY	:	Okatombaka No. 266
DISTRICT	:	Gobabis
CONTROL AREA	:	Windhoek-Gobabis Subterranean Water Control Area
VALIDITY PERIOD	:	Indefinitely. Subject to condition number 2
BOREHOLES TO BE DRILLED AND AUTHORIZED	:	Serial numbers WW 204869 – WW 204875
APPROXIMATE DRILLING DEPTH	:	130 metres maximum each
PURPOSE FOR WHICH WATER MAY BE USED	:	Irrigation

This permit authorizes the drilling of the four boreholes identified as WW 204869–WW 204872 as well as the authorization of the three boreholes identified as WW 204873–WW 204875 on the farm planning map, attached as Annexure A, subject to the following conditions:

1. The maximum abstraction quantity for irrigation from the boreholes concerned shall not exceed the total approved abstraction quantity of 149 000m³ water per year.

All official correspondence must be addressed to the Permanent Secretary.

2.

2. If drilling is not completed within three years from the date of this permit, this permit automatically expires and application shall be made to the Permanent Secretary for the issuing of a new permit.
3. This permit is incident to the property and if the present owner sells the property, the permit shall be handed over to the new owner.
4. Where a borehole is drilled in a riverbed, no embankments shall be constructed around the borehole in the riverbed which could result in the river damming up or its normal flow being impeded.
5. The Permanent Secretary or his authorized representative in consultation with the Minister shall have the right to:
 - (a) withdraw, amend or replace any condition of this permit or withdraw this permit in its entirety, after reasonable notice to the permit holder; and
 - (b) inspect the sources and installations at all reasonable times to determine whether the permit conditions are adhered to.
6. The Permanent Secretary shall not accept liability for damage or loss suffered by the permit holder should the relevant sources wane or run dry or the period of validity of the permit not be extended or renewed.
7. Should the permit holder not comply with any of the permit conditions:
 - (a) the Permanent Secretary may seal the boreholes until the conditions are complied with;
 - (b) the permit holder may be held liable for any costs which the Permanent Secretary may incur as a result thereof, and
 - (c) the permit holder shall be guilty of an offence and shall, on conviction, be liable to the penalties prescribed in Section 170 of the Water Act, 1956 (Act 54 of 1956).

8. TECHNICAL DETAILS

- 8.1 The boreholes shall only be drilled by a person, registered in terms of regulation 29 of Government Notice R1277 of 23 July.
- 8.2 Enclosed please find the number plates for the boreholes. The number plates shall be prominently placed for easy identification of the boreholes. (Do not attached to movables such as the pump or engine or to the concrete block around the casing.) Each borehole number plate shall be prominently placed for easy identification of the borehole.
- 8.3 At least one week before drilling commences, the permit holder shall contact the Geohydrology Division: Ms G E Mulokoshi at telephone (061) 2087075 at Windhoek indicating when drilling is to commence and who the drilling contractor is. As soon as the drilling operation is completed, the permit holder shall inform the control officer of this fact so that an inspection can be carried out while the drilling machine is still in position to check the depths and water levels of the boreholes. Failure to do so will be seen in a serious light and punitive measures will be applied.

3.

- 8.4 Samples of approximately 250 gram each shall be taken every one metre drilled and also each time the formation changes indicating on each bag the depths at which the samples was taken and the formation change occurred. These samples, together with the borehole completion reports shall be submitted to the Control Officer: Abstraction Control, or delivered to room 228, 2nd floor, Government Office Park, Windhoek.
- 8.5 If water is intersected during drilling, the permit holder shall leave openings of 25 mm in the borehole covers (which can be closed with screw plugs) positioned in such a way that there is space to measure the borehole water levels to the inside of the casings of the boreholes.
- 8.6 A step test and/or a constant discharge test are recommended to evaluate the sustainable abstraction rate. A minimum of four steps must be applied; each step should be at least one hour long. The recovery period after the step drawdown test should be observed for the same time period that was needed for all steps. The constant discharged test should be carried out over 8 hours drawdown time and 8 hours recovery time or 95% recovery. A water sample should be taken at the end of the test (drawdown period) and taken to a water chemical laboratory to analyse the water quality. The Division of Geohydrology must be notified prior to the test in order to provide technical guidelines for the test. The results of the drilling, pumping test and chemical analyses must be sent to the Department of Water Affairs, Geohydrology Division.
- 8.7 The permit holder must send monitoring data (quality and quantity) to the Geohydrology Division via Law Administration Division before the 10th day of the following quarter. Official quarters being regarded as January to March, April to June, July to September and October to December of each year. These records will give essential information in assessing and managing the regional groundwater resource in future. The monitoring data that needs to be submitted includes but not limited to water levels, chemistry, radio-nuclides and/or radio activity.



Percy W. Misika
PERMANENT SECRETARY

Appendix B: Hydrogeological Specialist Study

**AGRICULTURAL ACTIVITIES ON THE
FARMS OKATOMBAKA NO. 266, PORTION 1
(RIKA) OF OKATOMBAKA NO.266 AND
BOSVILLE WES NO. 755, OMAHEKE REGION
HYDROGEOLOGICAL SPECIALIST STUDY**



Assessed by:



Assessed for:

O.M. Steyn

November 2020

Project:	AGRICULTURAL ACTIVITIES ON THE FARMS OKATOMBAKA NO. 266, PORTION 1 (RIKA) OF OKATOMBAKA AND BOSVILLE WES NO. 755, OMAHEKE REGION, HYDROGEOLOGICAL SPECIALIST STUDY	
Report Version/Date	V1/ November 2020	
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Cite this document as:	Botha P.; Brunette C., October 2020; Agricultural activities on farms Okatombaka No. 266, Portion 1 (Rika) of Okatombaka No. 266 and Bosville Wes No. 755, Omaheke Region, Hydrogeological Specialist Study.	
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Report Approval	Pierre Botha Managing Director	

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LIST OF ABBREVIATIONS

CHIRPS-2	Climate Hazards Group Infra-Red Precipitation with Station data version 2
DWA	Department of Water Affairs
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMS	Environmental Management System
GPT	Geo Pollution Technologies
ha	Hectare
IGRAC	International Groundwater Resources Assessment Centre
m/s	Metre per second
Ma	Million years
mamsl	Meters Above Mean Sea Level
MAWLR	Ministry of Agriculture, Water and Land Reform
MAR	Magnesium Adsorption Ratio
mbs	Metres below surface
MEFT	Ministry of Environment, Forestry and Tourism
mm/a	Millimetres per annum
Mm³	Million cubic metres
SRTM	Shuttle Radar Topography Mission
TPA	Test Pump Analyses
UNESCO-IHP	UNESCO International Hydrological Programme

1 INTRODUCTION

Geo Pollution Technologies (Pty) Ltd was appointed by O.M. Steyn (the Proponent) to undertake a hydrogeological specialist study for irrigation activities on farm Okatombaka no. 266, Rika no. 266 (Portion 1) and Bosville Wes no. 755, next to the T1402 trunk road in the Omaheke Region (Figure 1-1). The Proponent has cleared 397 ha for purposes of crop cultivation, of which 97 ha is under irrigation and the remainder dryland cropping. Of the 97 ha irrigated land, 67 ha is currently cultivated in one planting season, while the remaining 30 ha is left fallow (uncropped). The main produce are maize, oats and moringa. Irrigation is from production boreholes, by means of centre pivot, combined drip and sprinkler and drip irrigation systems. Additional activities performed include livestock farming and wood and charcoal production.

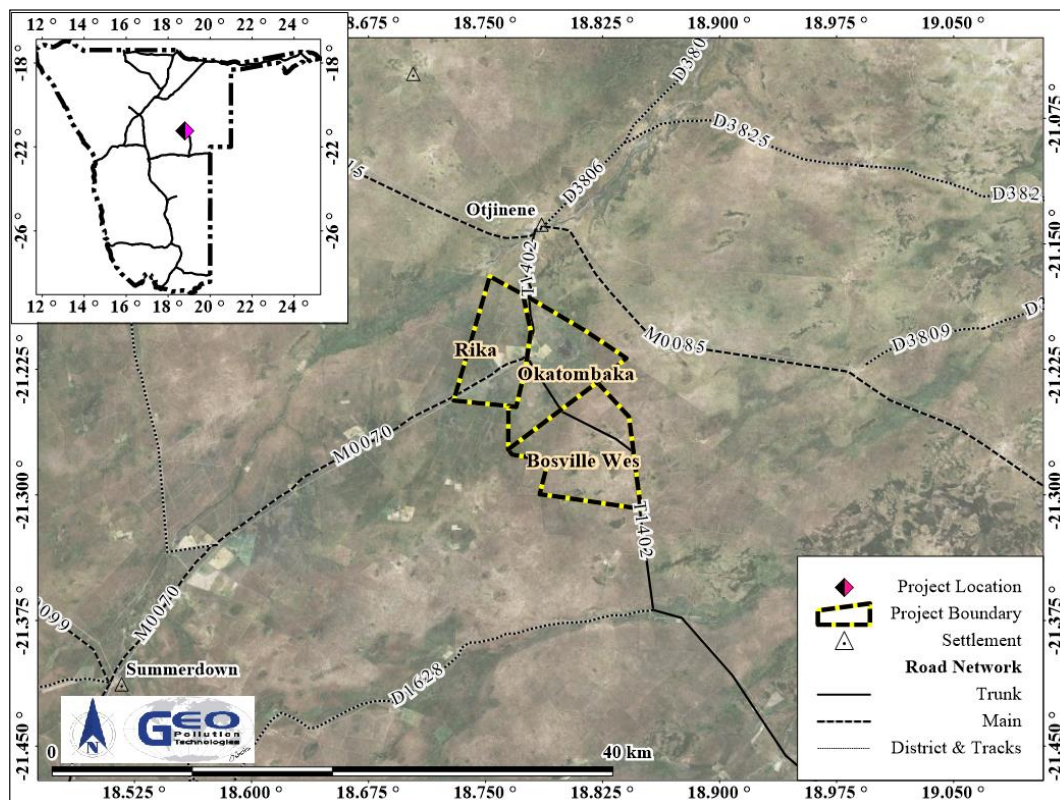


Figure 1-1. Project location

2 SCOPE OF WORK

The aims of the study were to:

1. Conduct a hydrogeological assessment based on a hydrocensus-survey of the project area.
2. Gather historic information and compile a hydrogeological assessment based on the information.

3 METHODOLOGY

Available geological and hydrogeological information/reports for the investigation area were obtained and reviewed. The hydrogeological catchment and sub-catchments within the investigation area were reviewed and delineated. This was based on historic groundwater level data contained in the Department of Water Affairs (DWA) database and on hydrocensus data done on behalf of the proponent. Satellite imagery such as SRTM 30 m data (Shuttle Radar Topography Mission) was utilised for the catchment delineation and elevation mapping purposes. Prepare a specialist report of the investigation.

4 LEGAL

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	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ Defines the environment. ◆ Promote sustainable management of the environment and the use of natural resources.
The Water Act Act No. 54 of 1956	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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)	<ul style="list-style-type: none"> ◆ 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 make the whole of Namibia a water control area 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 5-1. Abstraction permits are currently issued by the Ministry of Agriculture Water and Land Reform (MAWLR). The project falls outside a control area, thus an abstraction permit is not required.

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 LOCALITY AND SURROUNDING LAND USE

The project (21.2188 °S; 18.7793 °E) is located approximately 5.4 km south of Otjinene, along the T1402 trunk road (route no. C 22) in the Gobabis District. All adjacent properties are farms and land use consists of agriculture. The farms occur in the Omaheke Groundwater Basin. It should be noted that this groundwater basin is a management basin and that the actual groundwater flow basins differ from these boundaries. The project area forms part of the Northern Kalahari/Karoo Basin Transboundary Aquifer (IGRAC & UNESCO-IHP, 2015), (Figure 5-1).

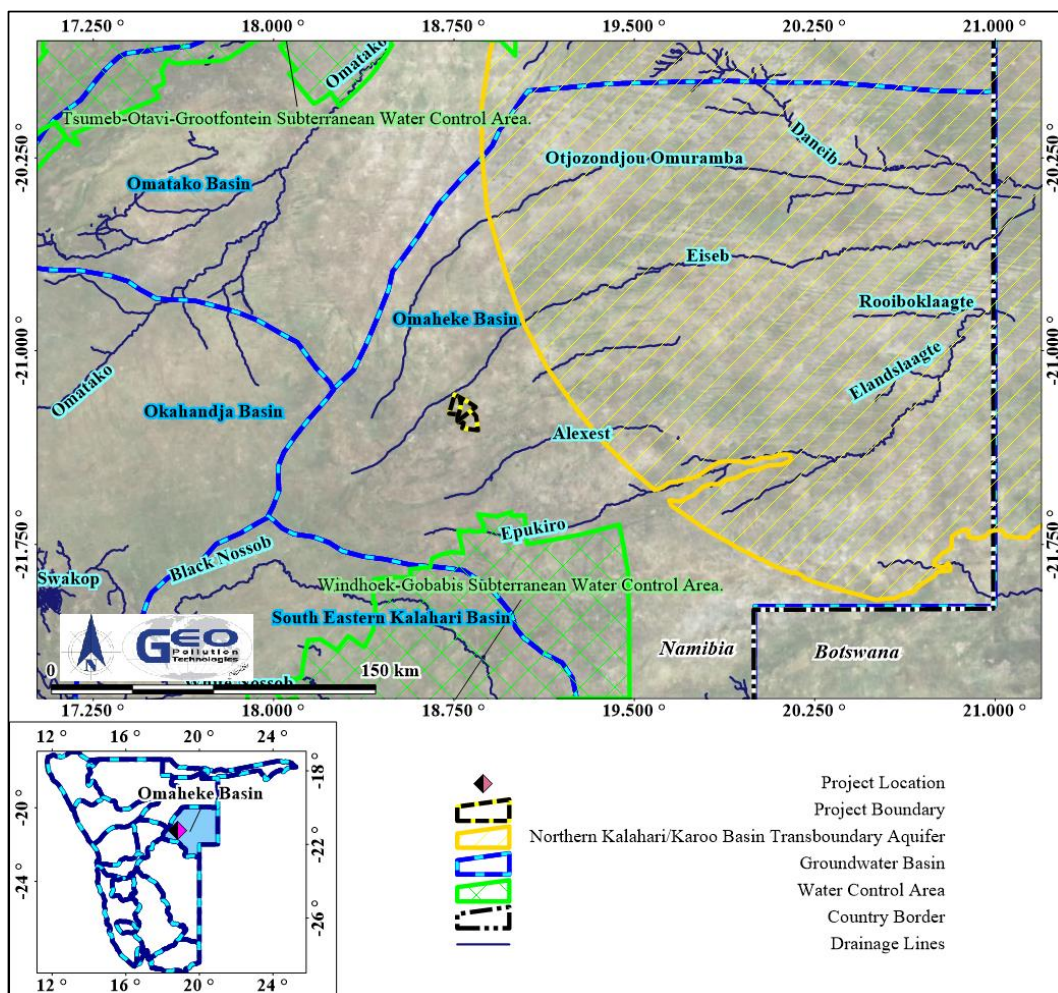


Figure 5-1. Groundwater basins, water control areas and transboundary aquifer

5.2 CLIMATE

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, Table 5-2 and Figure 5-2. Atlas of Namibia data was compiled from almost 300 rainfall stations across Namibia. The data was contoured in 50 mm intervals prior to 1999 for variable length data sets. 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.

The project area is situated in a semi-arid climatic region. Days are mostly warm with very hot days during the summer months, while nights are generally cool. The rain season normally starts in October and last until May, heavier rainfall (single day events) occur between November and March, with a single event of 85.3 mm in April (last 39 years data) being the highest. This is an obvious anomaly with most of the single day maximums being less than 40 mm.

The average annual rainfall for the last 39 years was calculated as 383 mm/a, with a coefficient of variance of 31 % (Table 5-2). This coefficient of variance correlate with Atlas of Namibia data of Table 5-1. Daily and seasonal rainfall data (Funk, et.al 2015) is presented in Figure 5-2. Seasonal (July to June) total rainfall, centred on the average line for the last 39 years, is presented, with the daily total rainfall and the seasonal cumulative rainfall. From the figure it is clear that since 2010 to 2020 six seasons received above average rainfall, namely 2009-2010, 2010-2011, 2011-2012, 2013-2014, 2016-2017 and 2019-2020. The rest were all below average with the driest year (last 39 years data) being 1994-1995, followed by 2018-2019. The rain season 2018-2019 is part of a dry period stretching from July 2017 until June 2019.

Table 5-1. Summary of climate conditions (Atlas of Namibia Project, 2002)

Variation in annual rainfall (%)	30-40
Average annual evaporation (mm/a)	2,800-3,000
Water deficit (mm/a)	1,501-1,700
Temperature (°C)	20-21

Table 5-2. Rainfall statistics (Funk, et.al 2015)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum (mm)	14.7	0.0	15.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum (mm)	275.5	205.3	138.3	110.3	12.4	2.1	1.0	0.8	7.6	36.2	97.1	164.4
Average (mm)	86.3	83.3	66.7	32.4	1.3	0.1	0.1	0.1	1.8	11.6	38.1	61.2
Daily maximum (mm)	35.4	38.7	39.6	85.3	12.4	1.0	1.0	0.8	5.6	11.9	19.9	27.8
Average rain days	10	9	6	2	0	0	0	0	1	3	7	8
Season July - June average: 383 mm						Coefficient of variation: 31 %						
Data range	1981-Jul-01 to 2020-Jun-30					Lat: -21.2188°S Long: 18.7793°E						

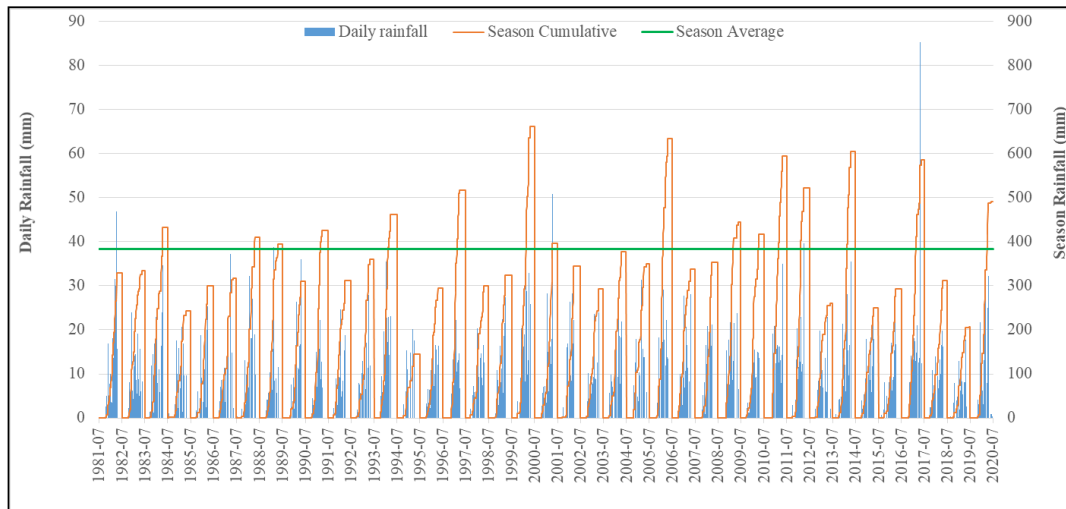


Figure 5-2. Daily and seasonal rainfall (Funk, et.al 2015)

5.3 TOPOGRAPHY & DRAINAGE

The general topography of the project area can be described as relatively flat, with the elevation decreasing towards the east. Regional surface runoff is therefore generally directed toward the east. The project area forms part of the Kalahari Sandveld landscape known for its palaeo dunes and pans, which can be observed in the larger study area.

Regionally, the project falls in the catchment of the Okavango River. Locally, surface runoff collects in the Eiseb River, which is located about 1 km north of the project area. Local drainage is therefore expected towards the north to the Eiseb River. The Eiseb flow towards the Okavango Delta in Botswana connecting with the Otjozondjou River about 80 km east of the border.

5.4 SOILS

The soils of the area can be locally classified as feralic Arenosols for most of the area of the farms with only a small portion in the northern corner of farm Rika no. 266 (Portion 1) comprising of eutric Fluvisols. Arenosols can be described as sandy soils with poor capacity to retain nutrients. These soils are common in arid and semi-arid environments and is associated with flat to undulating topography. Landforms associated with Arenosols is typically dunes, sand plains and sand ridges. Its parent material is aeolian sand.

Fluvisols is described as well drained fine to loamy sand. A Fluvisol is associated with flat to almost flat topography in drainage lines or valley bottoms. Its parent material is alluvial deposits. Figure 5-3 indicates the soil and surface geology of the project area. Surface geology is depicted as sand and calcrete.

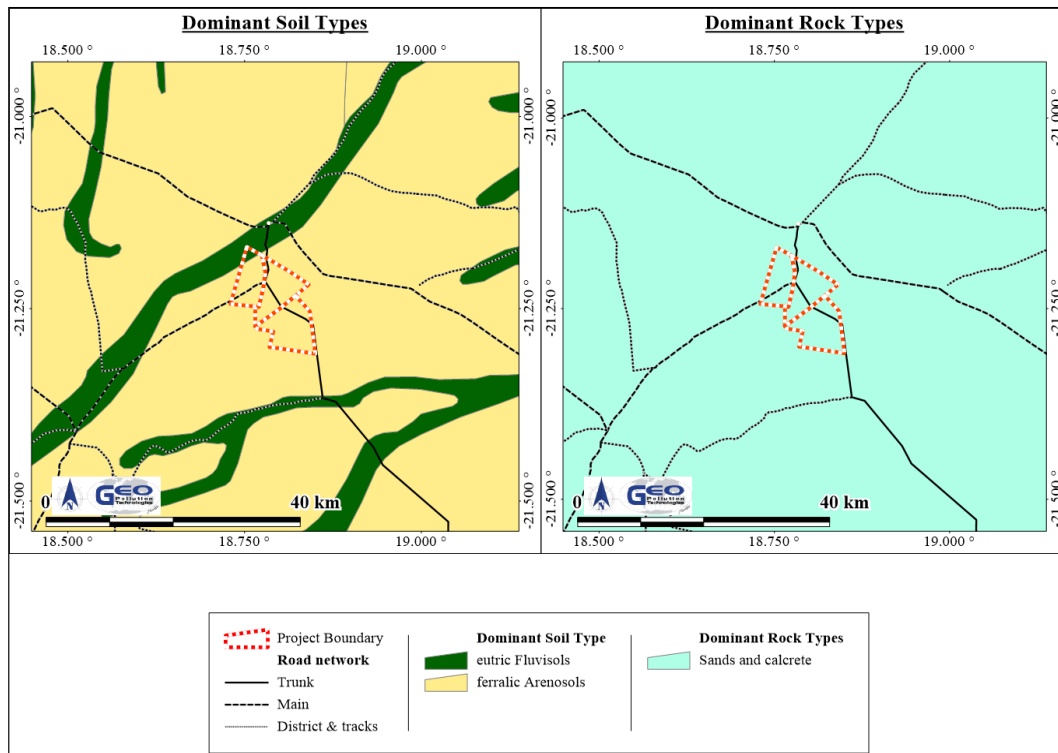


Figure 5-3. Dominant soil and rock type (Atlas of Namibia Project, 2002)

5.5 GEOLOGY AND HYDROGEOLOGY

The regional stratigraphic succession of the project area can be divided into geology belonging to the Namibian Age (Damara Sequence), Cambrium Age, Triassic Age, Jurassic Age and lastly Late Cretaceous- to Quaternary Age (Kalahari Group). Kalahari Group surficial deposits occur as overburden of varying thickness over hard rock substrata. Rock outcropping is relatively rare and scattered in the project region.

The Damara Sequence is divided into various tectonostratigraphic zones, the project area being within the Southern Zone, with the Okahandja Lineament or Okahandja Shear Zone being the northern boundary of this Zone, (Figure 5-4 and Figure 5-5). The Okahandja Lineament occurs about 45 km to the northwest of the project.

The Southern Zone is characterized as a low temperature-high pressure zone that locally contains formations comprising of schist, graphitic schist, quartzite, marble and calc-silicate of the undifferentiated Nosib and Swakop Groups. Swakop Group granite intrusions also occur in the study area.

Moderate folding of the Damara and Pre-Damara Sequence strata occurred during the Pan African Orogeny (680 - 450 Ma) and resulted in the formation of thrusts, synclines and anticlines. Rocks south of the Okahandja Lineament have isoclinal, overturned and thrust fold structures, which can be extended throughout the Southern Zone. Within the Southern Zone the foliation is mainly northwest-dipping, with a dip angle of 20° to 40° (Goscombe, et al. 2017).

A simplified structural profile across the Damara Belt is provided in Figure 5-5 with the approximate location of the project. 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 small extent of Cambrium Age geology comprising of serpentinite, chlorite schist and talc schist is mapped on farm Okasondana no. 264 about 20 km to the southeast.

Triassic- and Jurassic Age Karoo Supergroup rocks occur unconformably as near-horizontal layers over older geology, e.g., Damara Sequence. Omigonde Formation rocks, namely mudstone, siltstone and sandstone, outcrop about 54 km to the east and basalt of the Kalkrand Formation outcrop about 48 km to the northeast of the project (Figure 5-4).

Late Cretaceous to Quaternary Age Kalahari Group deposits rest unconformably over older pre-Kalahari rock formations and consist of a wide range of terrestrial sediments. These sediments originate mainly from fluvial deposition with some reworking through aeolian processes. The expected thickness of the surficial deposits at the project farms is approximately 50 - 100 m (Klock, 2001). The borehole completion sheet for WW2829, located close to one of the irrigation boreholes on farm Bosville Wes no. 755, indicate that bedrock was not intersected in its entire depth of 78 mbs, suggesting a cover thickness of at least 78 m. This borehole location can be seen on Figure 5-16.

The onset of Kalahari Group sedimentation is assumed to have started during the late Cretaceous (~ 65 Ma) when isostatic uplift of the continental margin of Namibia and South Africa started (Klock, 2001). Isostatic uplift led to the uplift of coastal escarpments and the evolution of the intracontinental hinterland basin where down warping took place. This down warping caused a change in drainage patterns into the Kalahari Basin that formed.

Rivers crossing the escarpment subsequently underwent rejuvenation due to the increase in drainage gradient with subsequent increased erosion. Rivers draining into the Kalahari Basin had a lower drainage gradient and therefore caused sedimentation in the flatter terrain. Figure 5-6 illustrates the Kalahari Basin with a profile indicating the escarpment and interior down warp. This profile example extend from the Atlantic Ocean through the Windhoek Municipal area toward the eastern border of Botswana. Elevation was obtained from SRTM 30 m data.

Terrestrial sediments tend to vary significantly between the stratigraphically equal units in the regional setting of the Kalahari Group. According to Klock (Klock, 2001) a general upward-fining trend of the clast-population and an upward decrease in clast abundance are observed, consisting of the basal Tsumkwe Formation, overlain by the Eiseb Formation and then by the Omatako Formation and most recent Aeolian Unit. The project is located near the southwestern edge of the Omatako Basin of the Kalahari Basin deposit area. It is expected that the Tsumkwe Formation is locally absent with only the Eiseb Formation and overlaying formations being present. The Eiseb Formation geology is dominated by altering fluvial sands, carbonate deposits and pebble horizons. The Omatako Formation consist of narrow unit of fluvial sand and ferruginous soil. Aeolian sand overlies the older geology, inter-fingering with inter-dune deposits. Palaeochannels present in these formations might cause local lateral changes over short distances.

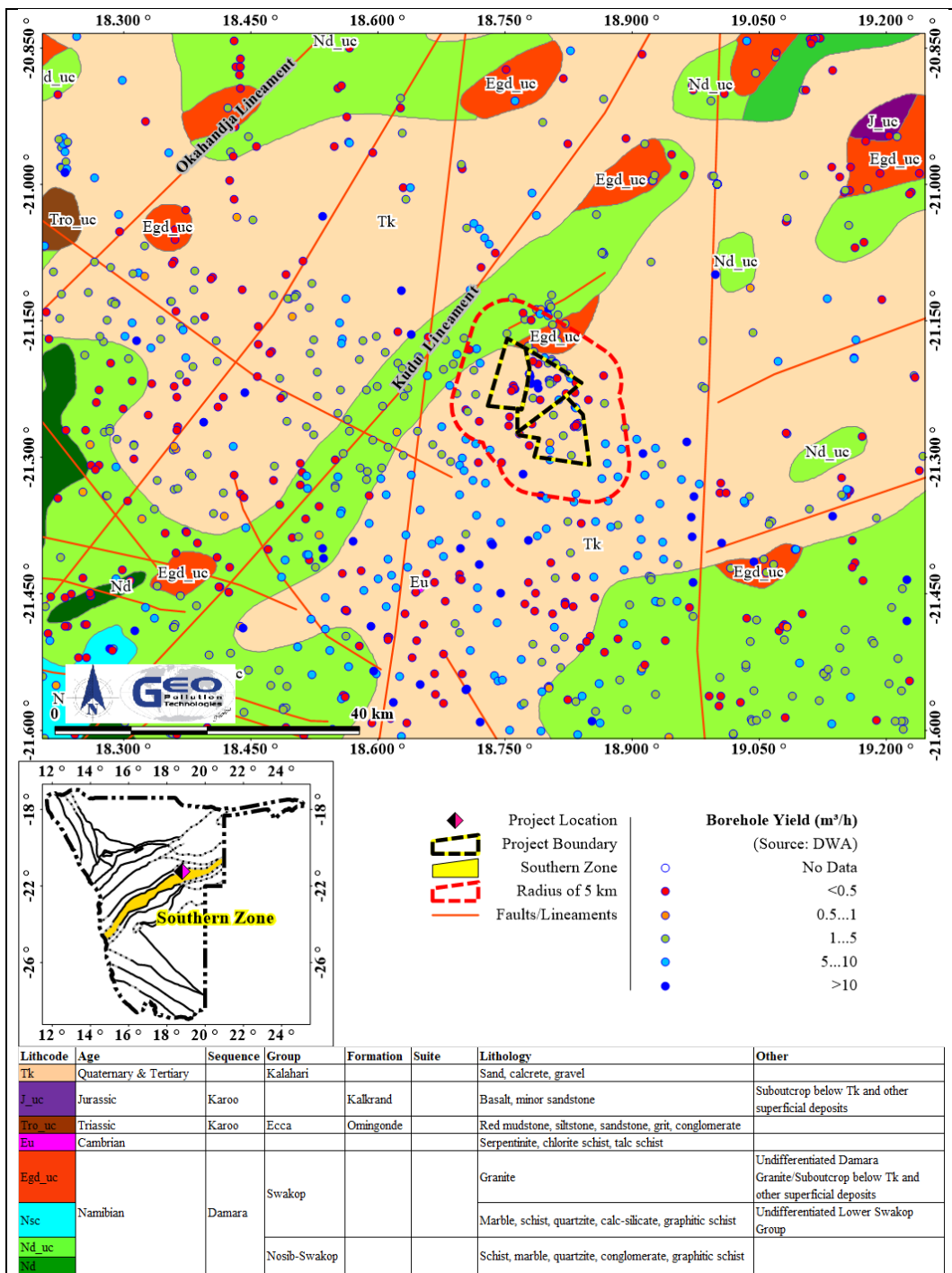


Figure 5-4. Regional geology map (GSN, scale 1:1,000,000)

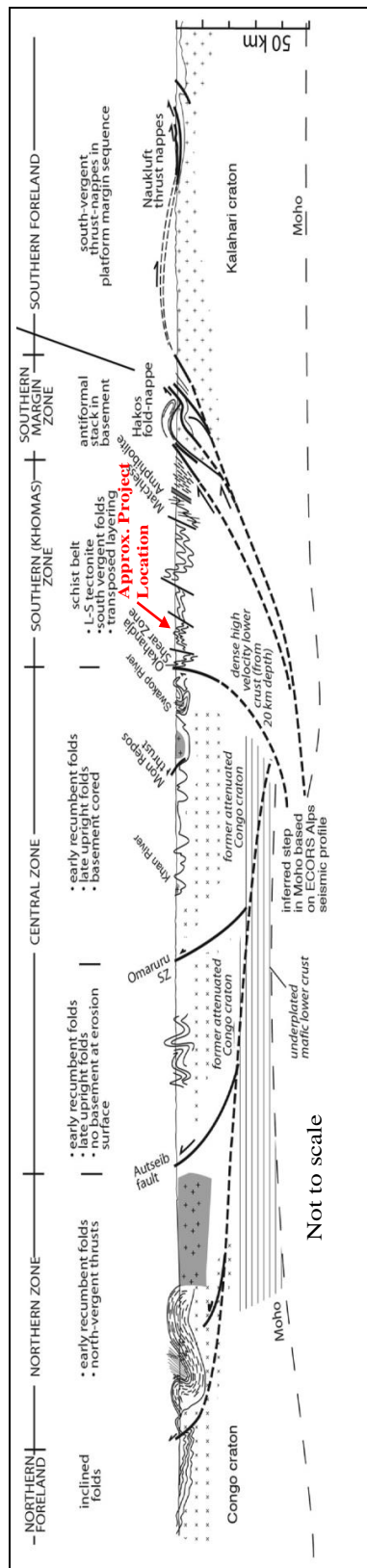


Figure 5-5. Simplified structural profile across the Damara Belt of Namibia (Goscombe, B., et al. 2017)

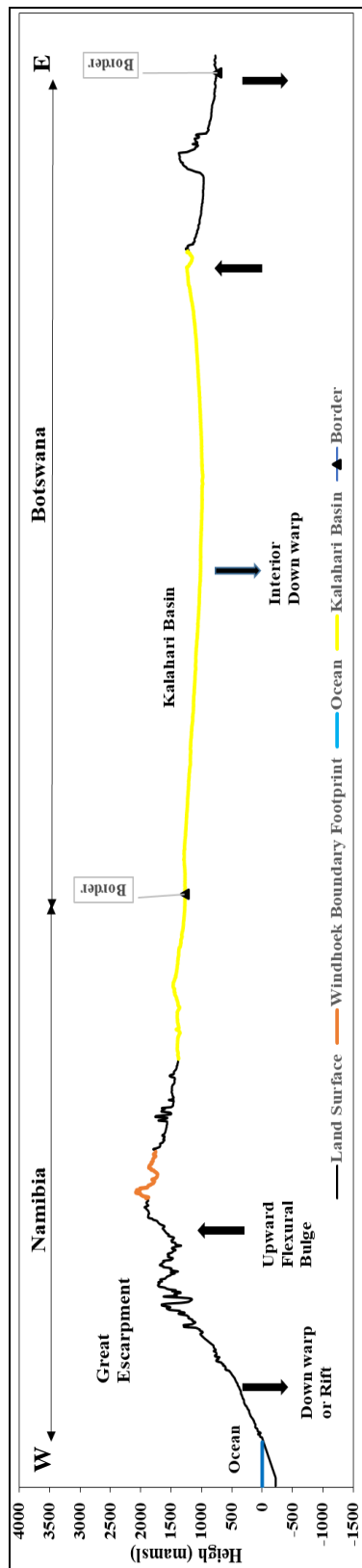


Figure 5-6. Profile across central Namibia and Botswana

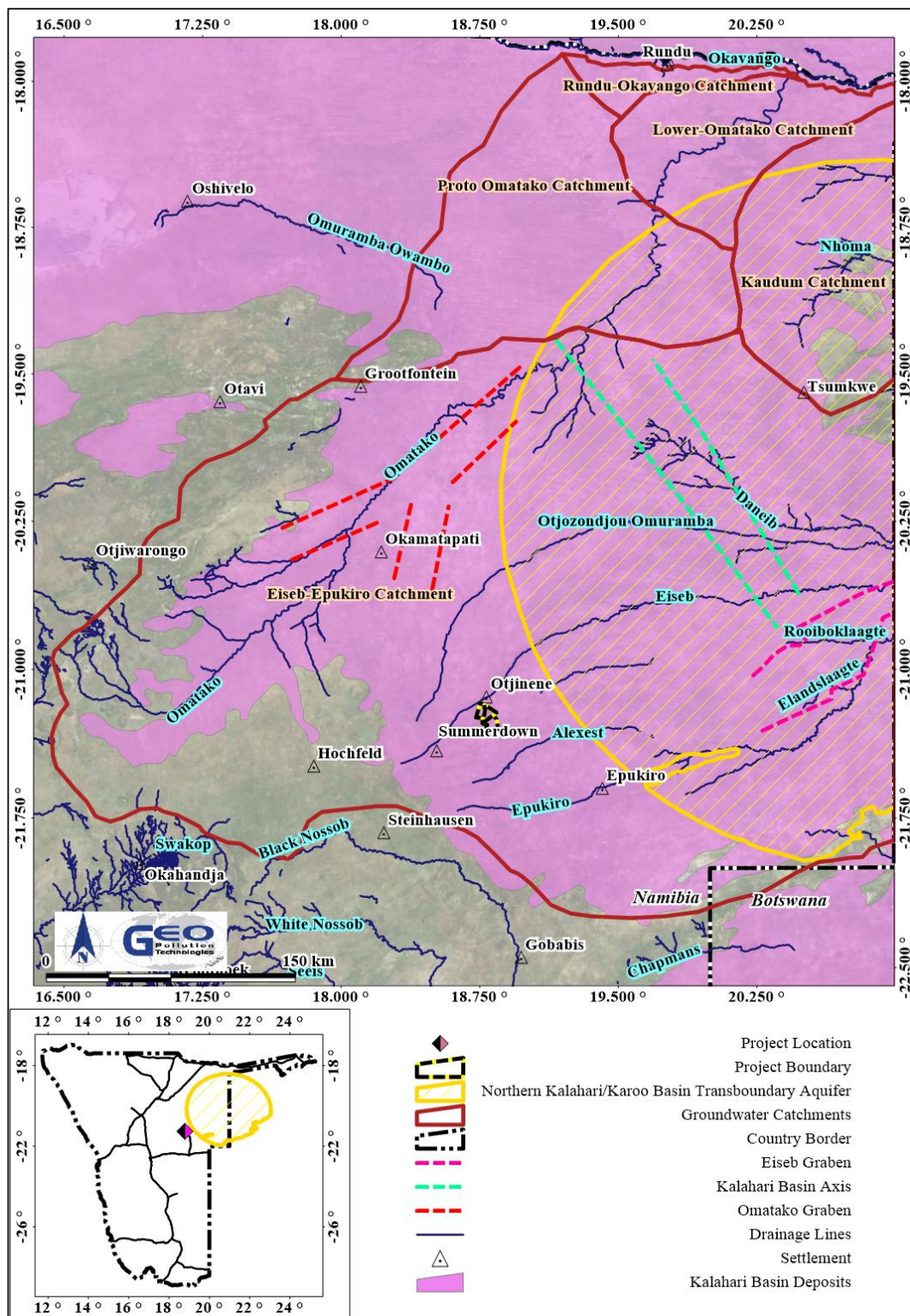


Figure 5-7. Groundwater catchments (Klock, 2001) and transboundary aquifer (IGRAC & UNESCO-IHP, 2015)

A groundwater basin for the area was determined through the calculation of water levels above mean sea level of borehole data contained in the DWA borehole database (Klock 2001). The project area falls in the Eiseb-Epukiro Catchment, named after the Epukiro and Eiseb rivers which flow in a similar direction as the groundwater, see Figure 5-7. Groundwater in this catchment generally flows eastward across the Botswana border in the Northern Kalahari/Karoo Basin Transboundary Aquifer system stretching across the Namibian border, see Figure 5-7.

Regionally, northwest - southeast and southwest - northeast depocenters occur in the area. Northwest - southeast trending depocenters are related to the uplift of the continental margin, as illustrated in Figure 5-8. An example of such a structure feature in Namibia is the Kalahari Basin axis as illustrated in Figure 5-7 and Figure 5-8. This feature is related to compressional tectonics that took place during the interior down warping.

Depocenters that trend southwest - northeast, like that of the Eiseb Graben, is related to rifting and extensional tectonics. This feature forms part of the larger Okavango Rift Zone, a still active tectonic setting thought to represent an extension of the East African Rift System which started during the Oligocene. The Eiseb Graben is the westernmost extension of the Linyanti and Gomare Fault (Stadtler, et.al 2005). According to Klock (Klock, 2001), northeast trending graben structures (e.g., Omatako and Eiseb Graben) developed along Damara pre-weakened crustal structures and are recently reactivated. Figure 5-8 represents the schematic profile of the depocenters in the region (Klock, 2001). Both these depocenters formed during and after deposition of Kalahari sediments, placing such sediments deeper than in the surrounding areas.

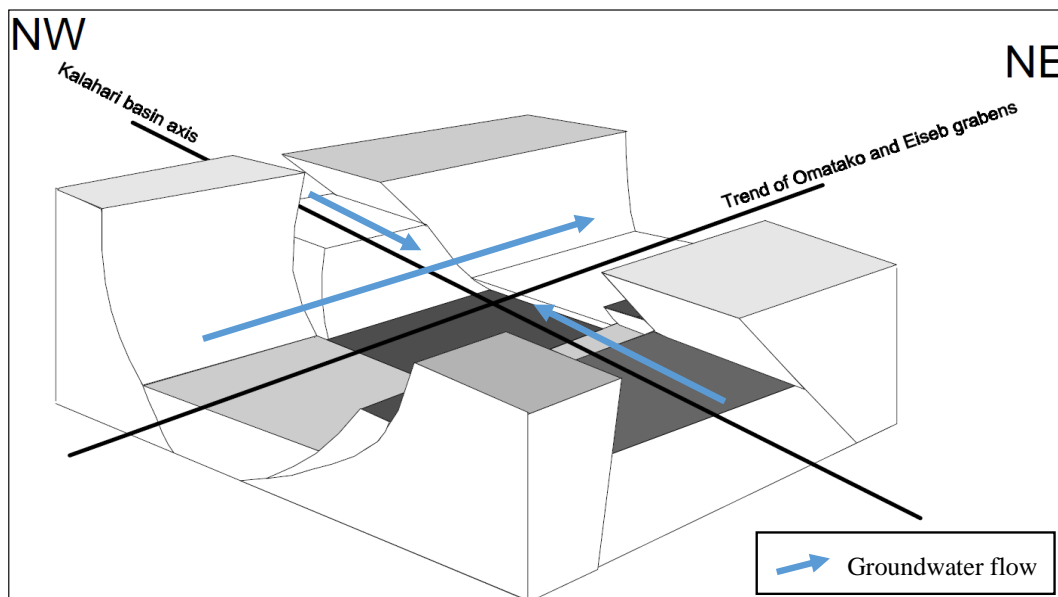


Figure 5-8. Schematic profile of extensional (southwest striking) and compressive (northwest striking) depocenters (after Klock, 2001)

A northeast-striking graben feature straddling the Namibian and Botswana border, namely the Eiseb Graben, occur within the transboundary aquifer setting. Due to the depth of the sediments in the graben structure, favorable groundwater conditions occur (Eiseb Graben Aquifer). The thickness of alluvial filling tend to be more towards the eastern extent of the Eiseb Graben.

Groundwater recharge to the Eiseb Graben Aquifer is assumed to take place through lateral flow from localized aquifers in the main ephemeral rivers (Eiseb, Rooiboklaagte and Epukiro) that make up the catchment of the Eiseb Graben. Recharge is also assumed to take place through lateral flow from localized aquifers in surrounding Kalahari Group deposits. Groundwater flow is generally projected toward Lake Ngami to the east (Margane, et.al. 2004). Figure 5-9 indicates

the approximate project location relative to the groundwater flow within the Eiseb-Epukiro Catchment. The extent of the groundwater catchment can be correlated to Figure 5-7.

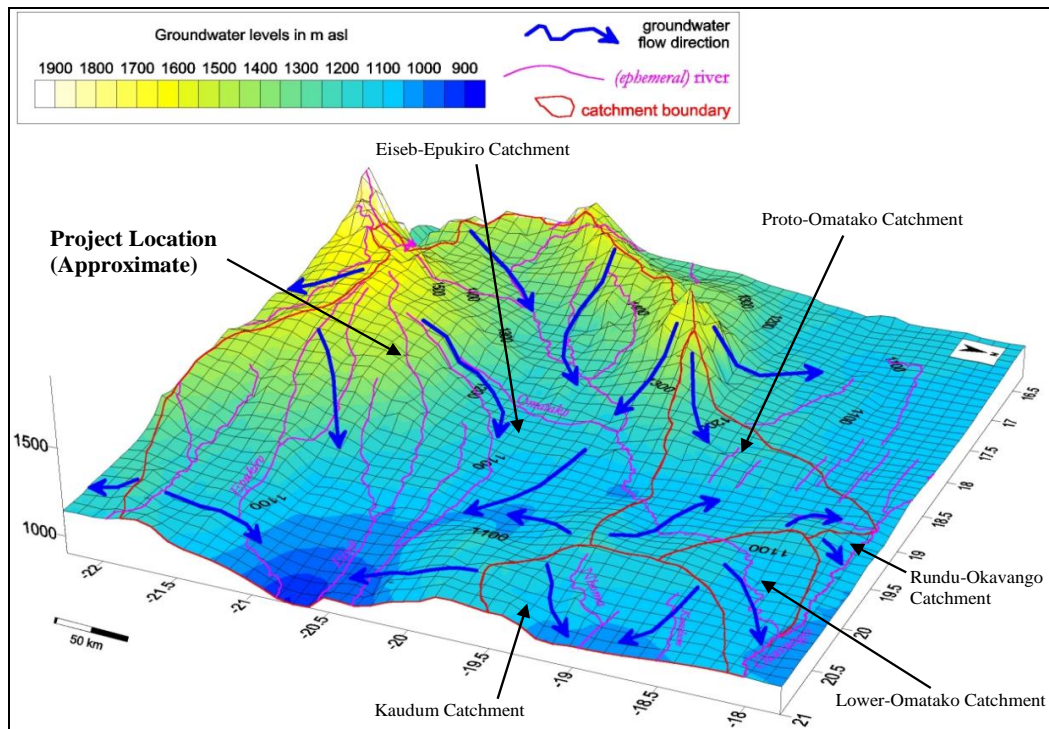


Figure 5-9. Groundwater flow and groundwater catchments (adapted from Klock, 2001) and approximate project location

Local flow patterns may vary due to groundwater abstraction and due to geological constraints, but the larger scale groundwater flow is expected to be from southwest to northeast toward the Eiseb Graben Aquifer. Local groundwater flow is expected to take place through primary porosity in the surface cover (Kalahari Group), 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 rock formations.

A profile was made through boreholes WW21223, WW10210, WW204963, WW204964, WW30530, WW28819, WW200054 and WW200053 to review the regional water level changes in the basin (Figure 5-10). The orientation of the profile is mainly directed down gradient toward the Eiseb Graben and has a length of about 450 km (Figure 5-11). Boreholes, WW21223 and WW10210, are located near Seeis and Omitara respectively, in the South Eastern Kalahari groundwater basin.

Boreholes WW204963 and WW204964 are located within the Eiseb-Epukiro Catchment (Omaheke Basin) and near the groundwater divide. Boreholes WW30530 and WW28819 are located near the Epukiro settlement and WW30530 forms part of the Epukiro Pos 3 NamWater scheme (Du Plessis, 2020). Boreholes WW200054 and WW200053 are located within the Eiseb Graben.

Regional water level monitoring data, sourced from the MAWLR – DWA, is presented in Figure 5-12. Monthly and seasonal (July to June) CHIRPS-2 rainfall data (Funk, et.al 2015) is also presented in Figure 5-12. The locations of the selected monitoring boreholes are presented in Figure 5-11.

Borehole WW21223 is situated in a different groundwater basin than that in which the project is located. Water level monitoring in this borehole started in July 1975 and ended in March 2018.

The historic water level in the borehole ranges between 1.96 to 5.28 mbs. This borehole was drilled near the Seeis River and rely on the primary porosity from the sands in the river. A nearby Namwater scheme may impact on water levels in this area. From Figure 5-12 it is evident that the water level in this borehole has a saw tooth pattern with a generally stable trend due to sufficient recharge from the Seeis River.

WW10210 is situated about 20 km east of the settlement of Omitara, and 500 m southwest of the White Nossob River. Data from this borehole is available from July 1985 up to June 2020, with some data gaps. The water level shows a slight downward trend, but a noticeable level increase is present during 2011, corresponding with a high rainfall season. After this, water level generally decreased over time.

Water level data of both boreholes WW204963 and WW204964 is available from November 2014 to June 2020, including some data gaps. During the short period no major changes were noted in the water level of the boreholes. These two boreholes are located near the documented groundwater divide (southern extent of Eiseb-Epukiro Catchment).

Borehole WW30530 is part of the Namwater Epikiro Post 3 water supply scheme and probably impacted by abstraction from this scheme. Water levels here seems to have a general increase in level with a good correlation with responses on above average rainfall seasons like in 2000, 2006 and 2011.

Borehole WW28819 is located near the Namwater Epikiro Post 10 water supply scheme and probably impacted by abstraction from this scheme. The water levels of WW28819 generally has a slight rise in level with less clear responses to above average rainfall seasons, as compared to data from WW30530.

Water levels at WW200053 and WW200054 are the deepest in the profile suggesting flow towards these boreholes. Both boreholes are located in the Eiseb Graben. Very little data is available for these two boreholes. Both boreholes generally has stable water level conditions with no clear response to above average rainfall seasons.

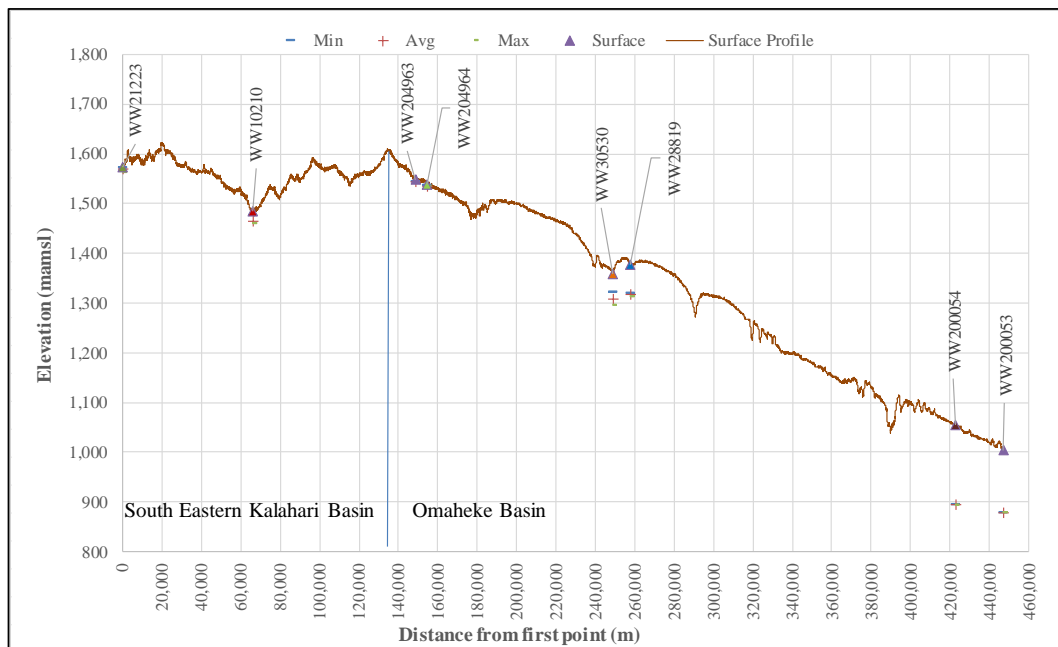


Figure 5-10. Regional surface elevation profile with water level information

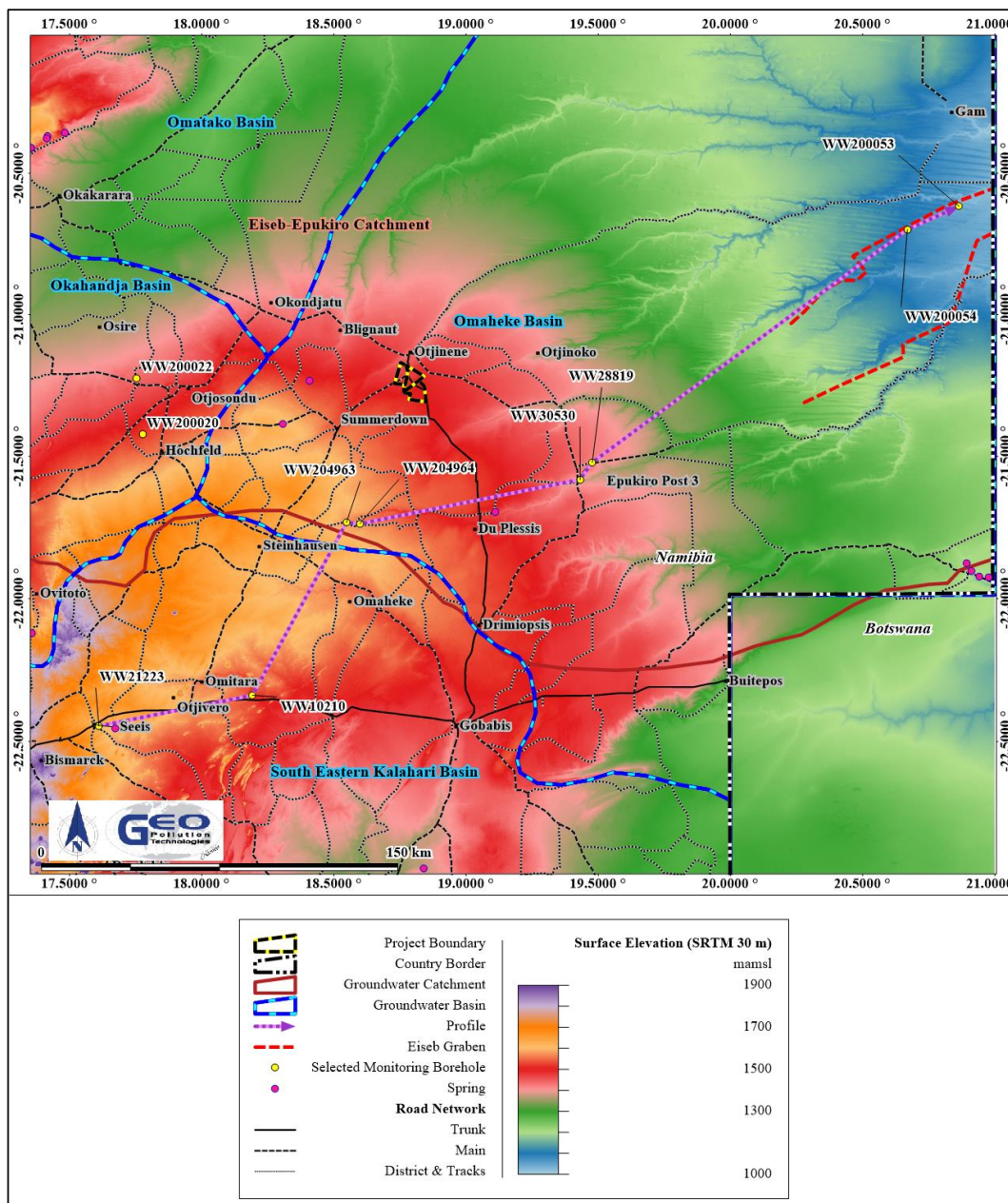


Figure 5-11. Monitor boreholes, profile, springs and Eiseb Graben with elevation

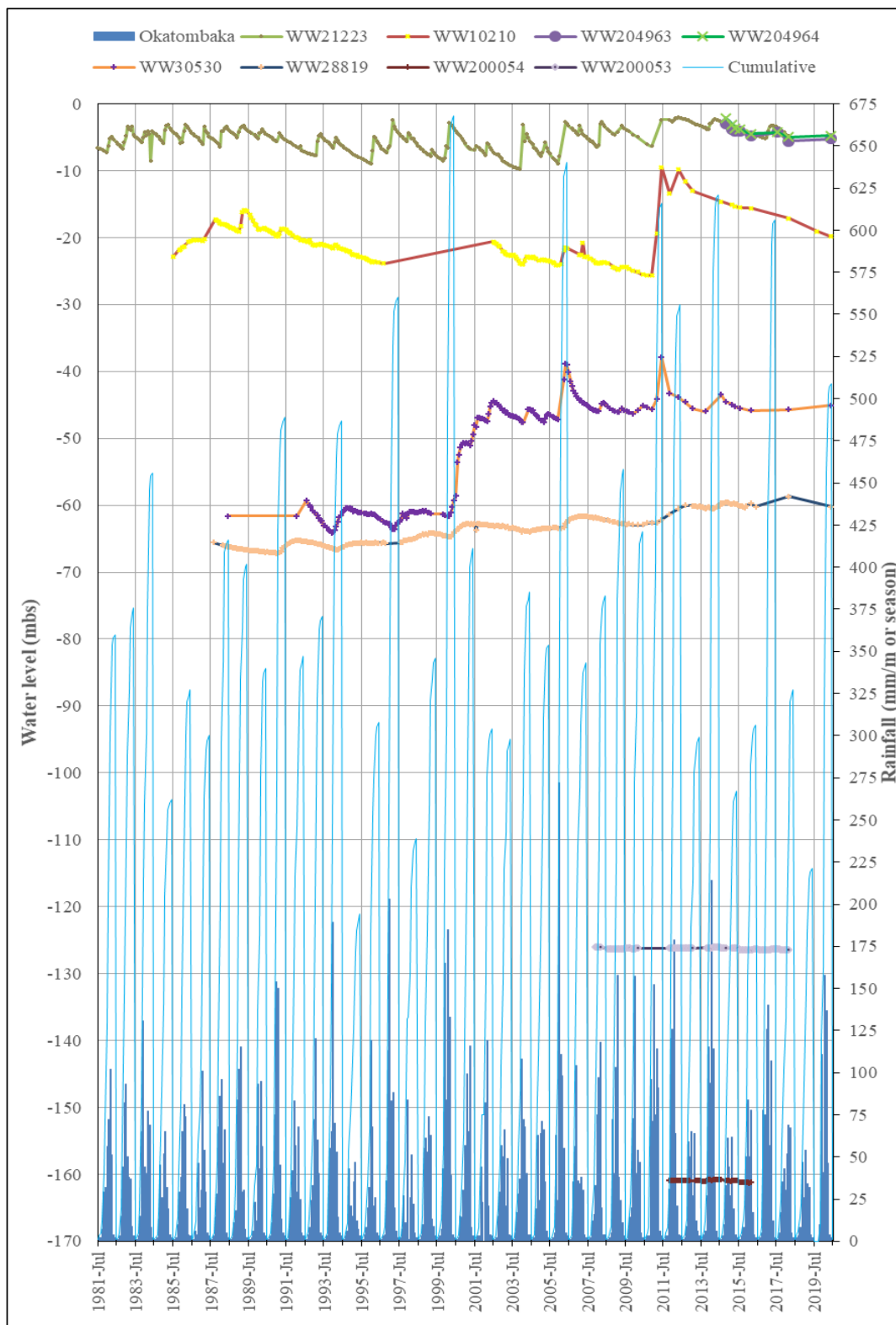


Figure 5-12. Regional water level changes (MAWLF; 2020) and monthly and seasonal cumulative rainfall at Okatombaka


Table 5-3 indicates the groundwater statistics for a radius of 5 km around the project. The groundwater information was obtained from Department of Water Affairs (DWA) borehole database. This database is generally outdated and more boreholes might be present. Groundwater is widely utilised in the study area, with a total of 23 boreholes known of within a 5 km radius. The boreholes were drilled to an average depth of 67 m below surface and yield up to 16 m³/h. Groundwater quality falls mainly under Group A with some boreholes having elevated levels of nitrates. The Group A category indicates that the water is of an excellent quality, based on the provided parameters.

Groundwater levels in the project area is generally shallow. Visual interpretations during the site reconnaissance showed groundwater emerge as surface water in borrow pits previously used for road construction. Two borrow pits, with depths between 3 and 4 m, is located next to the T1402 trunk road near the western border of farm Okatombaka no. 266.

Springs possibly related to the contact zones between relatively impermeable formations and more permeable formations or shallow groundwater conditions occur as scattered points throughout the region. The nearest spring is present approximately 34 km to the west of the project, see Figure 5-11. No caves or lakes are known of near (< 10 km radius) the project.

The project is located outside a water control area (Figure 5-1). Government therefore do not normally regulate groundwater usage in this area, e.g., drilling, cleaning or deepening of boreholes and rates of water abstraction.

Table 5-3. Groundwater statistics

Query Centre: Okatombaka; -21.2188°S; 18.7793°E		Query Box Radius: 5.0km										
		NUMBER OF KNOWN BOREHOLES	LATITUDE	LONGITUDE	DEPTH (mbs)	YIELD (m ³ /h)	WATER LEVEL (mbs)	WATER STRIKE (mbs)	TDS (ppm)	SULPHATE (ppm)	NITRATE (ppm)	FLUORIDE (ppm)
Data points		23			15	21	8	15	16	16	16	16
Minimum			-21.173804	18.731032	34	0	7	4	285	5	0	0
Average					67	5	17	17	426	30	8	1
Maximum			-21.263796	18.827568	125	16	25	32	942	53	53	1
Group A					46.67%	14.29%	12.50%	20.00%	100.00%	100.00%	81.25%	100.00%
Limit					50	>10	10	10	1000	200	10	1.5
Group B					20.00%	14.29%	87.50%	80.00%	0.00%	0.00%	6.25%	0.00%
Limit					100	>5	50	50	1500	600	20	2.0
Group C					33.33%	66.67%	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%	4.76%	0.00%	0.00%	0.00%	0.00%	12.50%	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.

Groundwater quality data is presented in Figure 5-13 as Maucha plots, Figure 5-14 and in Figure 5-15. From Figure 5-13 and Figure 5-14 it is clear that the groundwater of the project location is mostly of a calcium - magnesium - bicarbonate water type which suggest the water is recently recharged. Groundwater to the west and northwest of the project has higher concentrations of magnesium (Mg) and less dominance in calcium (Ca) than the rest of the area. Localised occurrences of water with more dominant sodium (Na), sulphate (SO₄) and chloride (Cl) concentrations are present mainly to the southeast of the project area. In the immediate farm area there seems to be an increase in total dissolved solid content, associated with an increase in the chloride (Cl) concentration (Figure 5-14).

Regionally, elevated Total Dissolved Solids (TDS) generally tend to correlate with the extent of the ephemeral rivers, see Figure 5-15. Localised evaporite mineral deposits in pans along river courses contribute to the elevated TDS concentration. However, note that some areas away from river courses also indicated an elevated TDS concentration. Although the hydrochemistry for the Eiseb-Epukiro Catchment is assumed to be relatively variable, there seem to be a trend from a

magnesium bicarbonate type to a sodium chloride- and calcium chloride type water toward the down gradient area of the Eiseb-Epukiro Catchment.

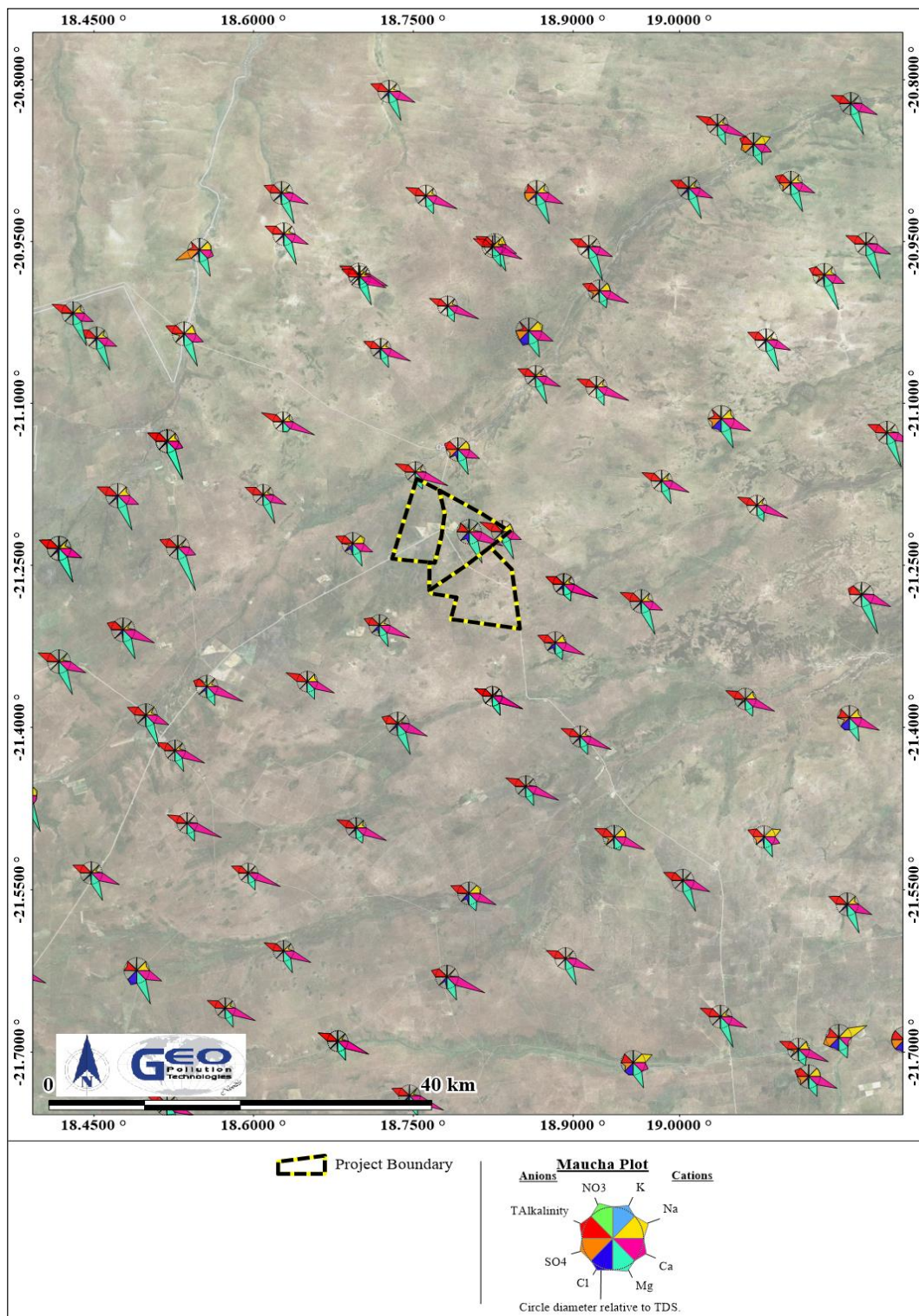


Figure 5-13. Historical hydrochemical data Maucha plot

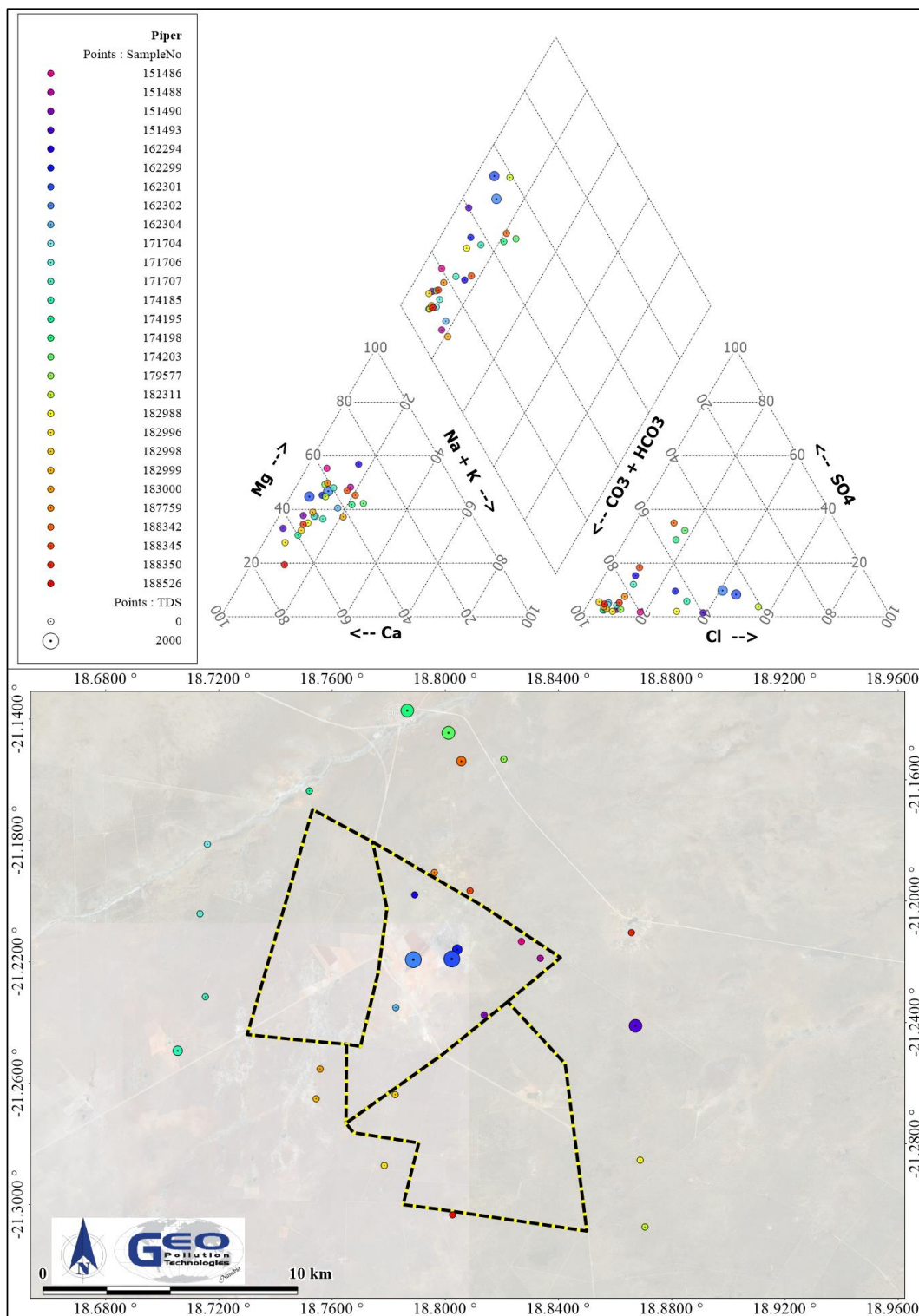


Figure 5-14. Historical hydrochemical data Piper plot for project vicinity

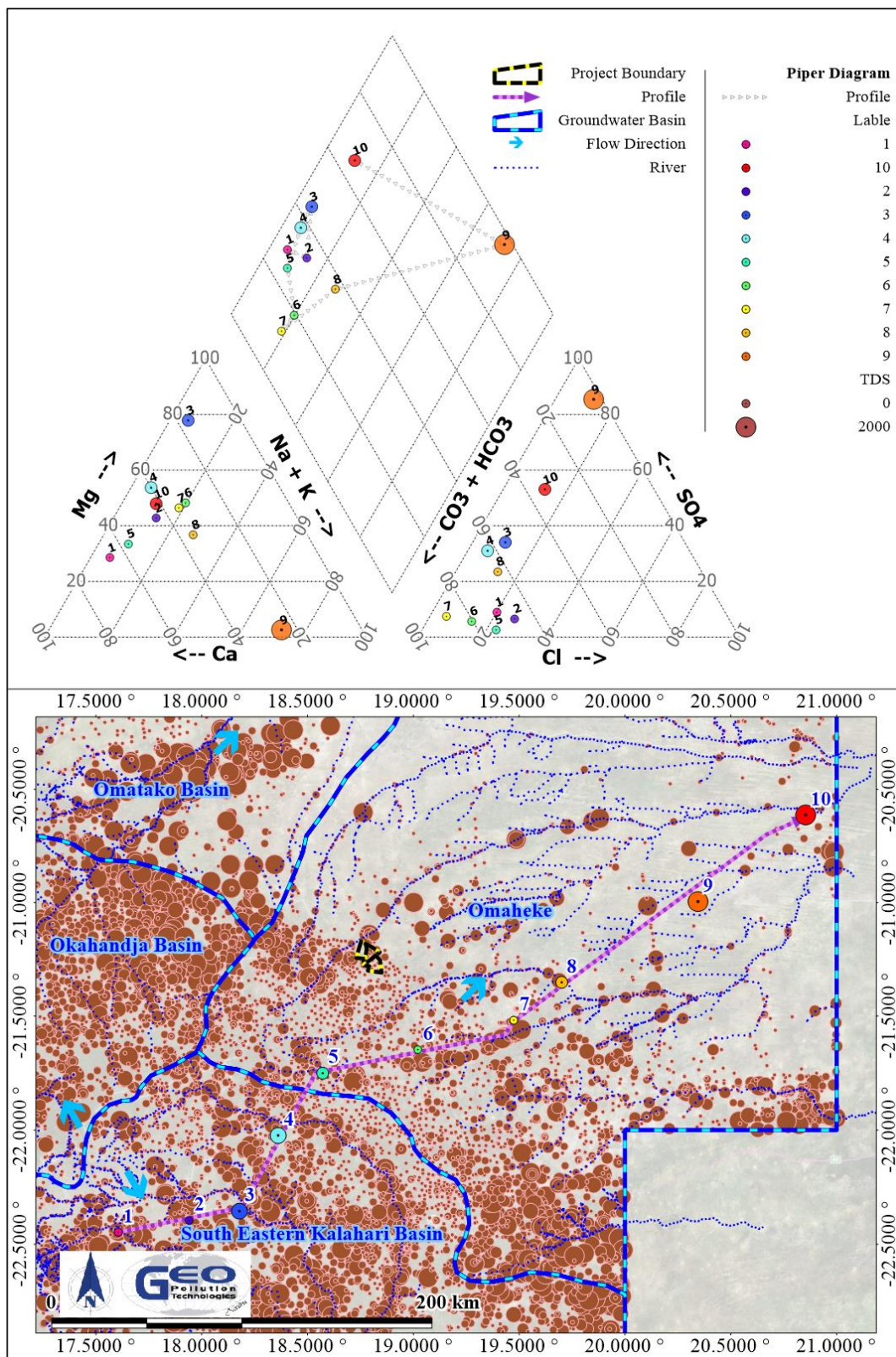


Figure 5-15. Historical hydrochemical data Piper plot for the region

5.6 PROJECT GROUNDWATER USAGE

The only available water source for the project is groundwater and the farms in the project area rely thus on boreholes for water supply for potable use, irrigation and livestock.

Although the project area falls outside a water control area, the proponent applied for a drilling and abstraction permit at the Department of Water Affairs (DWA) of the MAWLR. The proponent is therefore in possession of a permit authorizing the abstraction of water from boreholes WW204869 through to WW204875, dated 19 May 2017. This permit allows for the abstraction of 149,000 m³ per year.

Twenty four (24) boreholes are present on the three farms operated by the Proponent. A summary of the available borehole data received from the Proponent is provided in Table 5-4. The boreholes are used for purposes of potable water supply (domestic use), irrigation and/or livestock watering while two boreholes are currently not used and sealed off.

Of the 24 boreholes, 10 are used for irrigation: two on farm Rika no. 266 (Portion 1), four on farm Okatombaka no. 266 and four on farm Bosville Wes no. 755. Submersible pumps are installed in the boreholes to pump water via buried pipelines to reservoirs, where, on demand, the water is mixed with fertilizer and then transferred to the irrigation systems (i.e. centre pivot, drip and sprinkler systems). Irrigation boreholes are fitted with cut-off valves, non-return valves and pressure regulators. Note that only the irrigation boreholes on farm Rika no. 266 (Portion 1) and Okatombaka no. 266 are fitted with flow meters.

On farm Rika no. 266 (Portion 1) two boreholes at the farmhouse are utilised for domestic use and one is used for stock watering. On farm Okatombaka no. 266 there are three boreholes used for stock watering, while on farm Bosville Wes no. 755 there are six boreholes for stock watering. Figure 5-16 illustrates all the borehole data as received from the Proponent as well as contained in the DWA database on the farms and immediate vicinity. Note that some of the DWA boreholes is not in use any more and also not displayed in Table 5-4.

Pump and rest water level and abstraction data, as supplied by the Proponent, is presented in Figure 5-17. From the data it is clear that water level data over the monitoring period remained stable, with the last pump water level reading of borehole WW204871, being anomalous. Abstraction data indicates a seasonal relationship related to monthly rainfall figures. The total water abstraction for 2017 was 43,741 m³, 197,095 m³ for 2018 and 198,517 m³ for 2019.

Table 5-4. Summary of borehole information obtained from the Proponent

Map Ref.	Farm Name	Borehole Name	Use	Borehole Depth (m)	Yield (m ³ /h)	Water Level (mbs)
1	Rika no. 266 (Portion 1)	Rika Gras	Not used	120		7.7
2	Rika no. 266 (Portion 1)	Huis	Domestic		3	
3	Rika no. 266 (Portion 1)	Huis Wind Pump	Domestic			
4	Rika no. 266 (Portion 1)	Pivot Wind Pump	Stock Watering			
5	Rika no. 266 (Portion 1)	Rika Blou	Irrigation	116	40	
6	Rika no. 266 (Portion 1)	Rika Rooi	Irrigation	120	35	
7	Okatombaka no. 266	WW204872	Irrigation	120	30	
8	Okatombaka no. 266	WW204871	Irrigation	120	12	
9	Okatombaka no. 266	WW204870	Irrigation	120	110	4
10	Okatombaka no. 266	WW204869	Irrigation	127	60	3.5
11	Okatombaka no. 266		Not used			
12	Okatombaka no. 266	WW204873	Stock Watering			
13	Okatombaka no. 266	WW204874	Stock Watering			
14	Okatombaka no. 266	WW204875	Stock Watering			
15	Bosville Wes no. 755		Stock Watering			
16	Bosville Wes no. 755		Stock Watering			
17	Bosville Wes no. 755		Stock Watering			
18	Bosville Wes no. 755		Stock Watering			
19	Bosville Wes no. 755	WW15690	Stock Watering			
20	Bosville Wes no. 755		Stock Watering			
21	Bosville Wes no. 755	Kole Boorgat	Irrigation			
22	Bosville Wes no. 755	Ou Boorgat	Irrigation			
23	Bosville Wes no. 755	Nuwe Boorgat	Irrigation			
24	Bosville Wes no. 755	Huisie Boorgat	Irrigation			

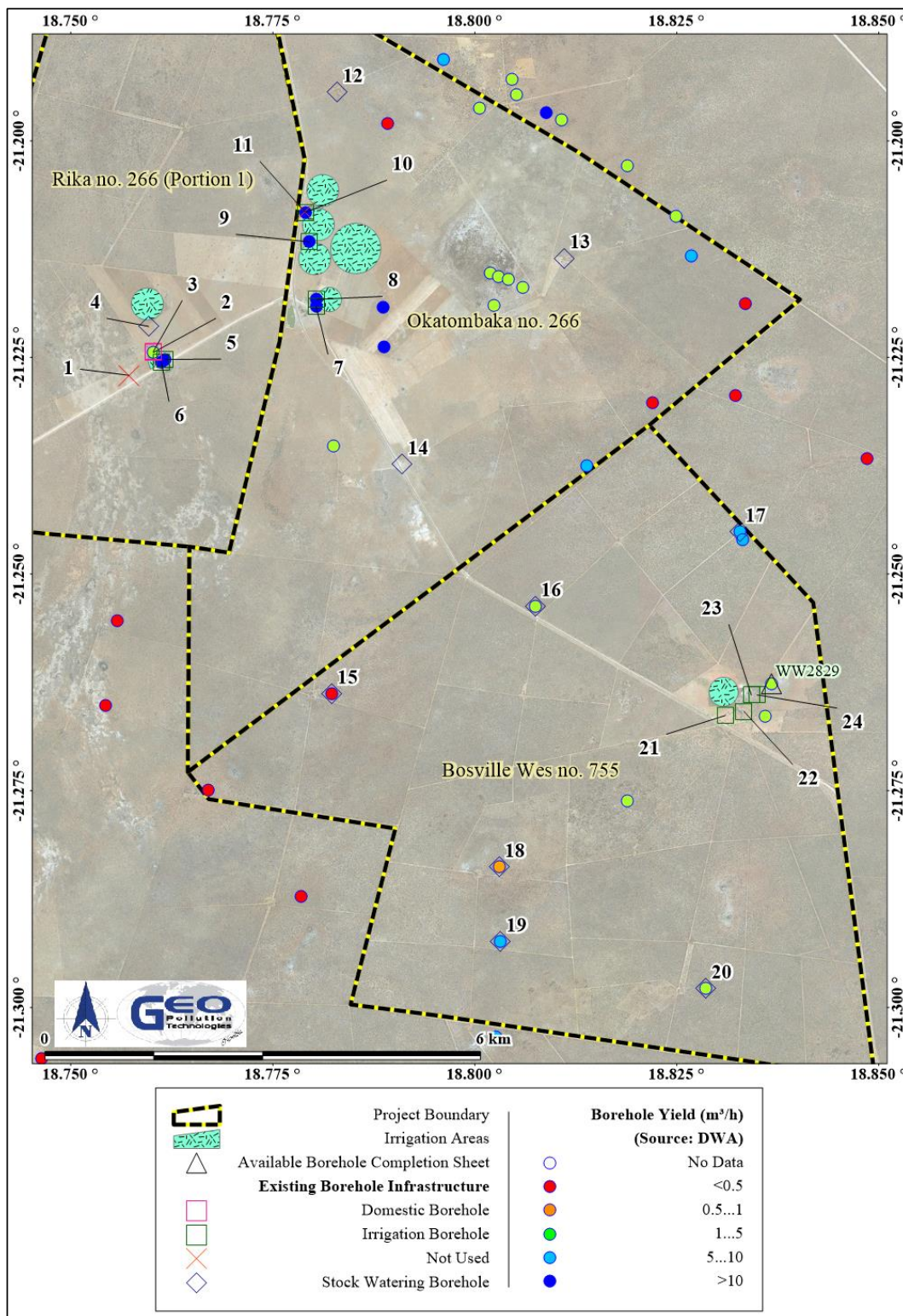


Figure 5-16. Location of boreholes and irrigation areas

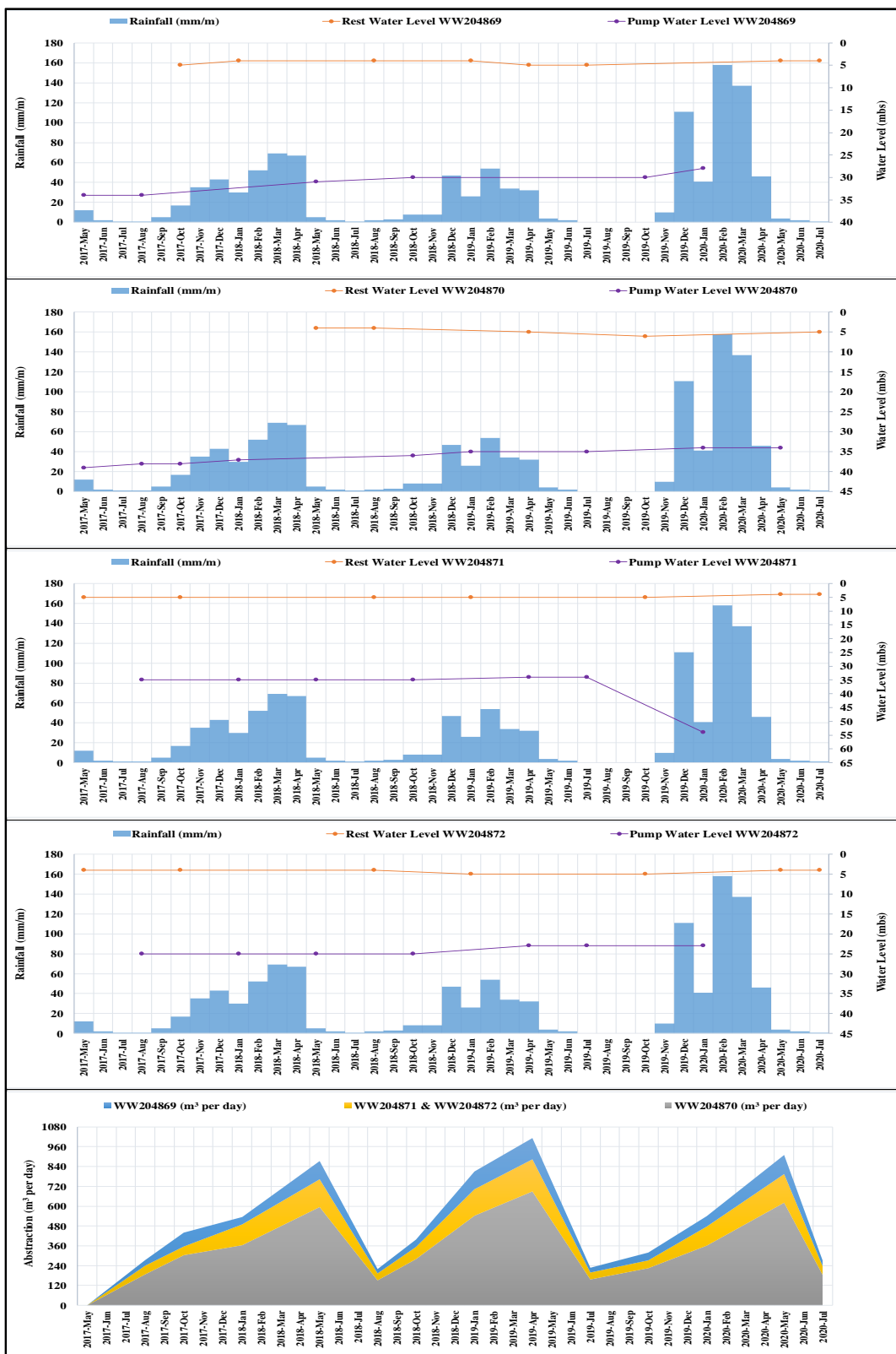


Figure 5-17. Abstraction borehole monitoring data

6 ASSESSMENT OF BOREHOLE DATA

Test pumping data from the Proponent was obtained and assessed.

6.1 TEST PUMPING

Test pumping data was supplied by the Proponent for borehole WW204869. A constant discharge test was conducted on the borehole in October 2016. Test pumping lasted 6 hours and recovery 3 hours. The rest water level for this hole was 2 mbs. Water levels dropped rapidly after test pumping commenced. After the first hour of test pumping the water levels stabilized and remained at 29 mbs until test pumping stopped. The borehole recovered back to its rest water level of 2 mbs within 5 minutes. It is expected that a more permeable layer is present below 29 m below surface, which is possibly the contact between the Eiseb Formation and overlaying aeolian deposits.

A Theis I drawdown analysis was applied to obtain the local aquifer parameters. The analysis indicated that the local aquifer has a T value (Transmissivity) of 122 m²/day (Figure 6-1). The accuracy of the test data is however questionable as the rate of abstraction increases for the first 40 minutes of the test, contrary to what is normally observed from submersible pumps. Water level and flow rate data has also no decimal figures, putting a question mark on the accuracy of such figures. Raw data is attached in Appendix A.

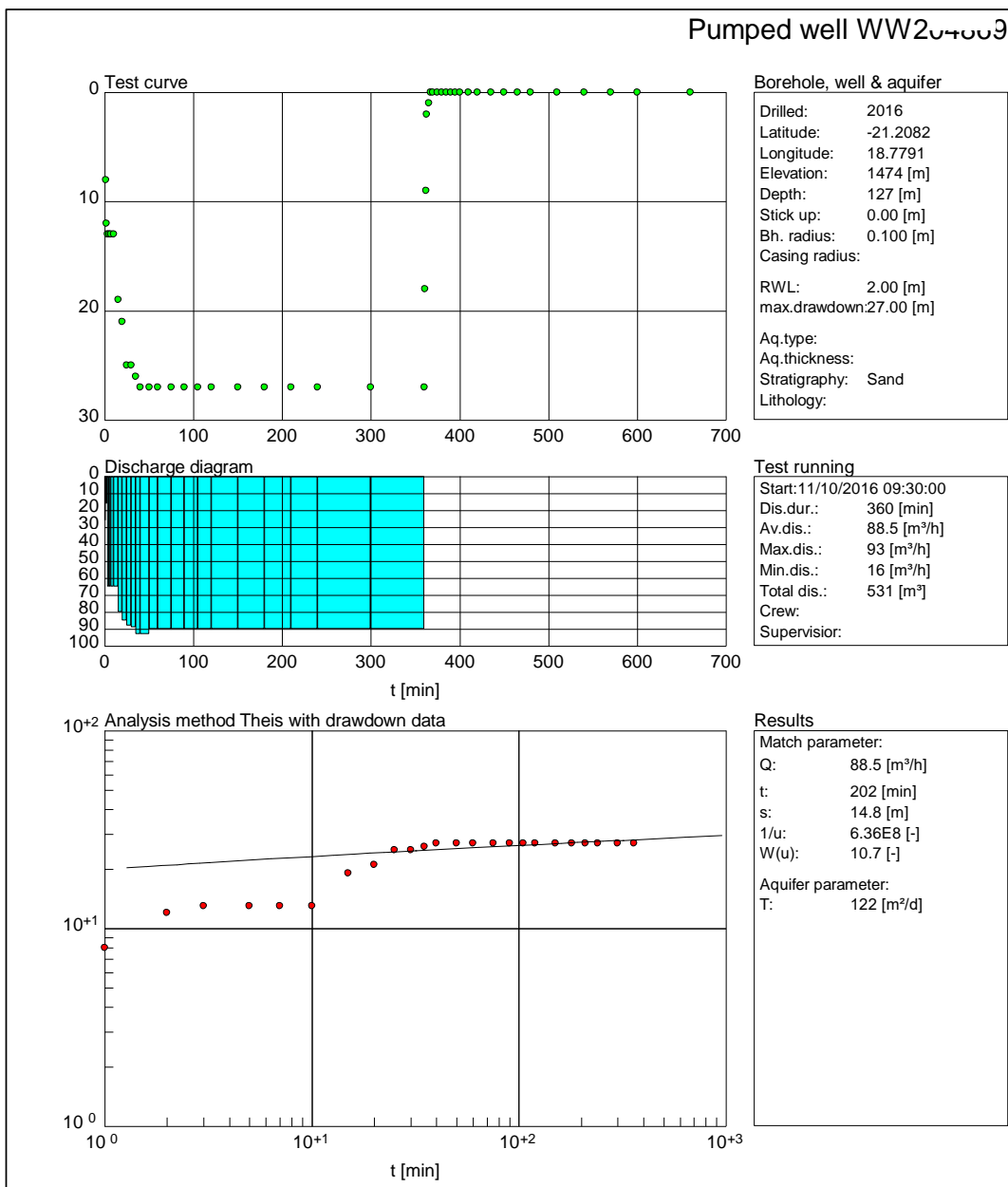


Figure 6-1. This I drawdown curve for WW204869

7 WATER SUITABILITY FOR IRRIGATION PURPOSES

Two water samples were collected by the Proponent in January 2019, named Borehole 1 and Borehole 2, and were submitted for water quality analysis. Sample name Borehole 1 was collected from borehole WW204869 (Map Ref. 10 on Figure 5-16) and sample Borehole 2 collected from borehole WW204870 (Map Ref. 9 on Figure 5-16). Chemical analysis are contained in Appendix B.

Calculations based on the analysis results indicate that samples have a low sodium hazard (S1). The sample WW204869 can be classified as having a high salinity hazard (C3) and sample WW204870 having a medium-salinity hazard (C2). Both samples had an injurious Permeability Index (injurious to plants), but however had a suitable Magnesium Adsorption Ratio (MAR), see Figure 7-1.

Medium-salinity water (C2) can be used if a moderate amount of leaching occurs. Plants with moderate tolerance can be grown in most cases without special practices for salinity control.

High-salinity water (C3) cannot be used on soils with restricted drainage. This is due to salt accumulation in the crop root zone, reducing the amount of water available to the roots. Even with adequate drainage, special management for salinity control may be required and plants with good salt tolerance should be selected. Reduced crop growth and yield can be expected.

Low sodium water (S1) can be used for irrigation on almost all soils with little danger of the development of harmful levels of exchangeable sodium.

The Permeability Index of soil is affected by irrigation water with high sodium, calcium, magnesium and bicarbonate content, coupled to its long term use. High sodium in the irrigation water can cause soil permeability problems. Permeability is also affected by CO_3^{2-} and HCO_3^- concentrations in the water. A portion of CO_3^{2-} and HCO_3^- is precipitated as CaCO_3 (or) MgCO_3 removing Ca and Mg from irrigation water and leads to increased precipitation of these elements.

Magnesium is essential for plant growth, but too much magnesium can have a severe toxicity effect on plants. A Magnesium Adsorption Ratio exceeding 50 is considered unsuitable for plants as it may increase the salinity of soil.

Care must be exercised when long term irrigation takes place on unsuitable soil.

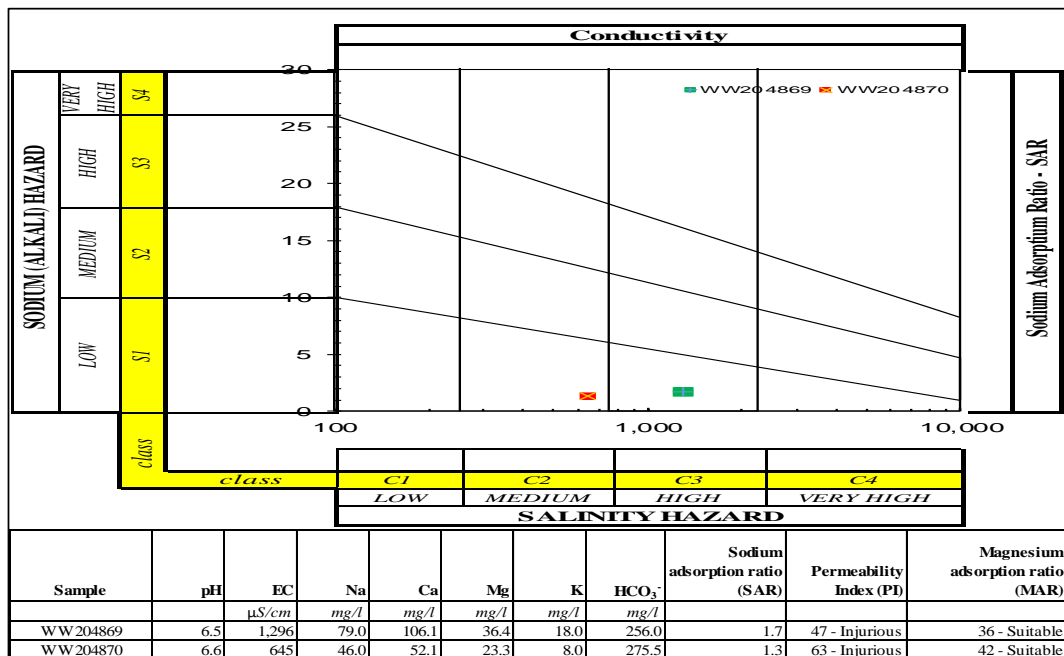


Figure 7-1. Groundwater sodium adsorption ratio

8 SOIL SUITABILITY FOR IRRIGATION PURPOSES

Fifteen (15) soil samples were collected during August 2019 on the farms and chemical analysis were performed. Chemical analysis are contained in Appendix B. The exact locations of the sampling points are not known, but the results give a general idea of the soil type and quality for the project area. The soil had a pH value ranging between 4.9 and 7.3 and can be described as acidic to slightly alkaline soil. High soil pH values can cause deficiency of nitrogen, phosphorus and micro elements such as iron, manganese, boron, copper and zinc. Figure 8-1 below indicate the solubility of elements at different pH levels, the red square represents the pH levels present in the project farms' soil.

A summary of the soil sample results are depicted in Table 8-1. All elements highlighted in blue has low concentrations of the elements as required by plants. All highlighted in orange has high concentrations of the elements that can be harmful to plants. All the elements highlighted in white is in the most efficient range as required by plants. Half of the samples showed pH levels best for crop production (pH between 5.5 and 6.7). At this level cation exchange of plant nutrient cation will take place, ensuring effective plant growth. The pH of the soil samples references SP C2, SP D1 and SP E is slightly high for crop production, this can be expected in a calcrete rich environment, as calcrete have acid buffering properties and therefore elevate soil pH, making the soil more alkaline.

All the soil have deficient organic carbon. When laboratories analyse for organic matter it includes hydrogen, oxygen, nitrogen and other elements that are components of organic compounds, not just carbon. In contrast, total organic carbon is a measure of only the carbon contained within soil organic matter. All samples showed sufficient concentrations of magnesium. It should be noted that a lack of magnesium cause stunted plant growth, thus reducing efficiency of crop production. Some samples indicated deficiencies of potassium and calcium. Sodium is not a plant nutrient and therefore is not necessary for plant growth. However, high levels of sodium are detrimental to soil tilth and plant growth.

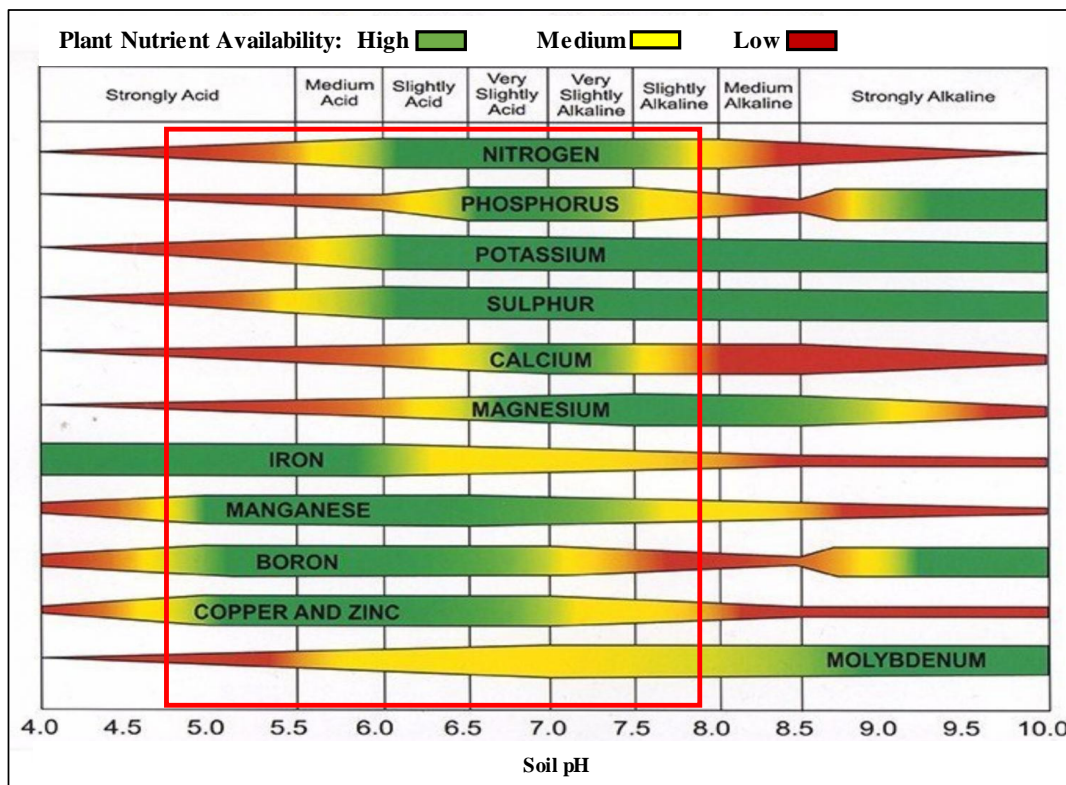


Figure 8-1. Soil pH effects on availability of elements (after University of California; 2019)

Table 8-1. Soil sample results

Type of Test:		pH	Organic carbon (C)	Potassium (K)	Magnesium (Mg)	Calcium (Ca)
<i>Method details:</i>		<i>(KCL)</i>				
Lab No.	Sample Reference		% m/m C	mg K/kg	mg Mg/kg	mg Ca/kg
1	Curry Post 1	6.20	0.28	136.00	96.00	701.00
2	Curry Post 2	5.70	0.20	74.00	91.00	569.00
3	Rika Spilpunt	5.90	0.20	70.00	65.00	262.00
4	Klein Droëland	5.40	0.24	135.00	107.00	553.00
5	Ou Grootland 1	5.40	0.36	112.00	124.00	599.00
6	Ou Grootland 2	5.20	0.34	165.00	160.00	833.00
7	Bosville SP	5.50	0.21	93.00	60.00	342.00
8	SP A	6.40	-	122.00	121.00	623.00
9	SP B	6.70	-	131.00	146.00	710.00
10	SP C1	6.30	-	181.00	170.00	1,137.00
11	SP C2	7.90	-	118.00	147.00	730.00
12	SP D1	7.30	-	104.00	116.00	500.00
13	SP E	6.80	-	128.00	114.00	600.00
14	Rika Droëland	4.90	0.38	104.00	66.00	362.00
15	SP D2	6.60	-	159.00	172.00	861.00
	Low		Medium		High	
pH	<5.5		5.5 - 6.7		>6.7	
Organic Carbon	<0.9%		0.9% - 1.3%		>1.3%	
K	<150 mg/kg		150 mg/kg - 250 mg/kg		>250 mg/kg	
Mg	<60 mg/kg		60 mg/kg - 180 mg/kg		>180 mg/kg	
Ca	<1,000 mg/kg		1,000 mg/kg - 2,000mg/kg		>2,000mg/kg	

9 ASSESSMENT OF IMPACTS

The purpose of this section is to assess and identify the most pertinent environmental impacts and provide 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 9-1.

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 9-2).

Environmental Classification = $A1 \times A2 \times (B1 + B2 + B3)$

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). See Table 9-3 and Table 9-4 for the final assessment of expected impacts.

Table 9-1. Environmental classification of impacts according to the rapid impact assessment method of 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 9-2. 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

9.1 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 conducted in a sensible way to prevent impacts 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.

In a typical groundwater environment, a water balance would consist of inflow and outflow of the groundwater system (Figure 9-1). Over time an equilibrium (or steady state) is normally reached with a rising water table following good recharge events and declining water table when recharge is below average. Inflow into the system would typically be from infiltration following rainfall in the recharge 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 dependant on the abstracted groundwater.

The project is located about 60 km north of the Eiseb-Epukiro Catchment documented groundwater divide. Although the project is a considerable distance away, excessive abstraction may influence upstream or downstream receptors on the long run. Typical consequences of over abstraction will include a lowering in the water table. Lowering of water table may further lead to the drying up of boreholes and springs. Vegetation will also be impacted where such vegetation has access to groundwater. It is important to note that the groundwater basin forms a transboundary aquifer that extent from Namibia into Botswana. Over abstraction in any of the countries will have a negative impact on the other countries and can causes disputes. As the groundwater flows from the recharge area in Namibia, out to Botswana, care must be taken in Namibia to ensure that the quality of water is not affected as this will later on affect the neighbouring country.

Based on current water level fluctuations in the area, as presented in this report (Figure 5-12), a short term threshold of 5 m below the average rest water level of borehole data is set from where abstraction rates should be reduced.

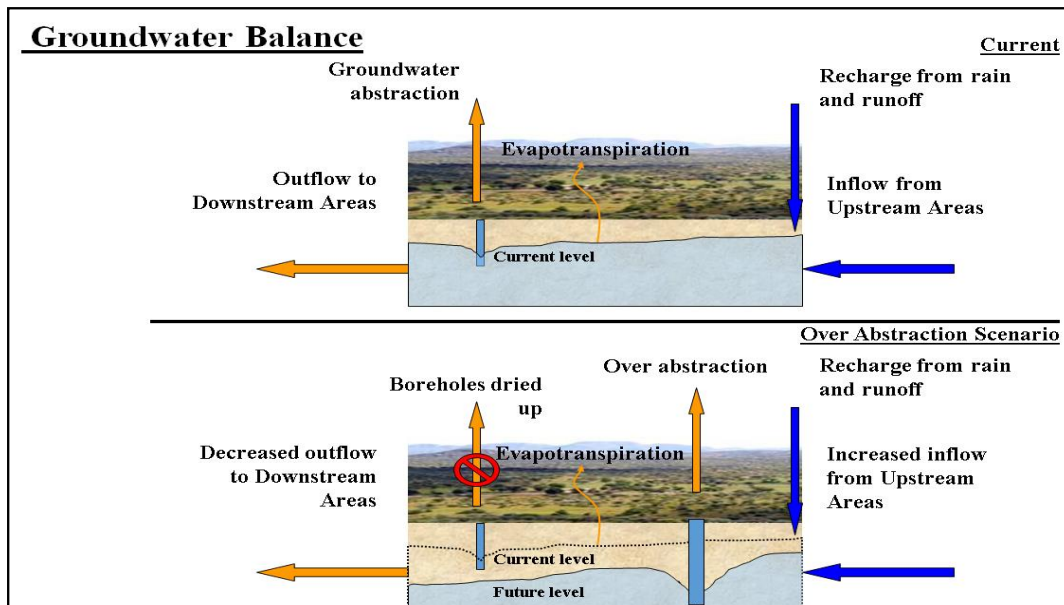


Figure 9-1. Conceptual groundwater balance with over abstraction scenario

Table 9-3. 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	2	2	2	-24	-3	Probable

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

Actions

Prevention:

- ◆ Spread the water abstraction points over a larger area to diffuse the impact.
- ◆ Monthly water level monitoring.

Mitigation:

- ◆ Reduce abstraction when the water levels nears 5 m below the average rest water level of each borehole.

Responsible Body:

- ◆ The 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 summary report on all monitoring results must be prepared.

9.2 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 9-4. 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	2	2	1	-10	-2	Improbable

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.
- ◆ 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, including any polluted soil or water.

Mitigation:

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

Responsible Body:

- ◆ The proponent
- ◆ Contractors

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 Proponent 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.

10 CONCLUSION

Groundwater on the farm is high yielding and can be used for irrigation. Although groundwater monitor data on farm Okatombaka no. 266 is only short term (May 2017 to July 2020), the data do not indicate a decline trend of water levels (Figure 5-17). Typical pump water levels was noted in this data, when abstraction is lifted, water levels return to the same level prior to abstraction. Data from the long-term groundwater monitor installations generally show stable groundwater level conditions. Based on current water level fluctuations in the region, as presented in Figure 5-12, a short term rest water level threshold of 5 m below the average rest water level of each borehole 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 farms utilising water from the aquifer, on 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 data obtained from DWA indicates a lack of sufficient monitoring in the recent years. Proper monitoring data will provide the required information to make informed decisions.

Groundwater vulnerability to contamination would be the highest around boreholes, around geological structures as well as where shallow groundwater is present. Contamination risks can be reduced through proper fertilizer, herbicide and pesticide application. Annual groundwater and soil analysis from irrigation areas will serve as early warning of contamination problems. These impacts are normally of a low magnitude and can be managed through proper housekeeping.

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Appendix A: Test Pumping Data



Northern Pump Services
 P.O. Box 1378
 Tsumeb
 Tel: 09 264 67-222680
 Fax: 09 264 67-222656
 pjplumbing@iway.na

Cell: 0812413898
 Vat No 0136316015

MAIN DISCHARGE TEST FORM

NAME: OM Steyn for Okatambaka properties
 TEL. NO.: 081 261 2803
 P.O BOX: WHK 32254
 DATE: 11/10/2016
 FARM: Okatombaka No 266
 E-MAIL: ockertina@iway.na
 GPS: S21°12,706 E18°46,771

DIAMETER: 200mm
 B/HOLE NO.: Toetsgat 2 *www 204 869*
 B/HOLE DEPTH: 127m
 PUMP DEPTH: 90m
 PUMP CAPACITY: 90qub/h
 DURATION: 6h
 Water Level: 2m

PUMP					RECOVERY			REMARKS
Clock Time [hh:mm]	Pump Time [min]	Water Level [m b collar]	Flowmeter Reading [m³/h]	EC [S/cm]	Start Time [min]	Recovery Time [min]	Water Level [m b collar]	
9h30	1	10m	26		15h30	1	20m	
	2	14m	16			2	11m	
	3	15m	16			3	4m	
	4	16m	65			4	3m	
	5	15m	65			5	2m	
	7	15m	65			7	2m	
	10	15m	65			10	2m	
	15	21m	65			15	2m	
	20	23m	80			20	2m	
	25	27m	85			25	2m	
1 Hr	30	27m	88		30	2m		
	35	28m	89		35	2m		
	40	29m	93		40	2m		
	50	29m	93		50	2m		
	60	29m	90		60	2m		
	75	29m	90		75	2m		
	90	29m	90		90	2m		
	105	29m	90		105	2m		
	120	29m	90		120	2m		
	150	29m	90		150	2m		
2 Hr	180	29m	90		180	2m		
	210	29m	90		210	2m		
3 Hr	240	29m	90		240	2m		
	300	29m	90		300	2m		
4 Hr	360	29m	90		360	2m		
	480	29m	90		480	2m		
5 Hr	600	29m	90		600	2m		

Appendix B: Chemical Analyses



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CHEMICAL WATER ANALYSIS REPORT

DETAILS OF SAMPLE:

SAMPLE NUMBER : DS52541
SENDER : Steyn OM
SAMPLE POINT NAME : Farm:Okatombaka No266
AREA DESCRIPTION : -
LOCATION DESCRIPTION : Borehole 1 -
COMMENTS : -

DATE SAMPLE TAKEN : 2019-01-31
TIME TAKEN : -
DATE SAMPLE RECEIVED : 2019-02-01
DATE SAMPLE ANALYSED : 2019-02-05

DETERMINANT :	Value	Units	Classification
pH	6.5		A - Excellent
Conductivity mS/m	129.6	mS/m	A - Excellent
Total dissolved solids calculated from conductivity	868	mg/l	
Sodium as Na	79	mg/l	A - Excellent
Potassium as K	18	mg/l	A - Excellent
Sulphate as SO ₄	85	mg/l	A - Excellent
Nitrate as N	11.1	mg/l	B - Good
Nitrite as N	<0.1	mg/l	
Silicate as SiO ₂	85	mg/l	
Fluoride as F	0.7	mg/l	A - Excellent
Chloride as Cl	90.0	mg/l	A - Excellent
Total Alkalinity as CaCO ₃	210	mg/l	
Total Hardness as CaCO ₃	415	mg/l	B - Good
Calcium as CaCO ₃	265	mg/l	A - Excellent
Magnesium as CaCO ₃	150	mg/l	A - Excellent
Iron as Fe	0.01	mg/l	A - Excellent
Manganese as Mn	0.01	mg/l	A - Excellent
Turbidity	0.53	NTU	A - Excellent
Colour	8.0	mg/l Pt	Within recommended limit
Boron as B	0.13	mg/l	

REMARKS :

CLASSIFICATION FOR CHEMICAL QUALITY OF DRINKING WATER IN RESPECT OF DETERMINANTS AS ABOVE :
Class B : Suitable for human consumption
Stockwatering : Suitable

M.Conradie Pr.Sci.Nat.
Applied Scientific Services: Laboratory Services
conradiem@namwater.com.na
DS52541

Although Namwater, will endeavour to perform a correct analysis, neither Namwater, or any of its officials shall be liable for damages arising from loss or injury caused directly or indirectly by or contributed by or arising from any inaccuracy of the analysis or the interpretation thereof.



ADDITIONAL INFORMATION : DS52541

Stability pH : 7.15

Langelier Index : -0.65 - Corrosive

Ryznar Index : 7.80 - Corrosive

CORROSIVITY POTENTIAL OF WATER TOWARDS STEEL : 1.02 - Corrosive

IRRIGATION CLASSIFICATION : C3 - S1

HIGH-SALINITY WATER (C3)

Cannot be used on soils with restricted drainage. Even with adequate drainage, special management for salinity control may be required and plants with good salt tolerance should be selected.

SODIUM

The classification of irrigation waters with respect to SAR is based primarily on the effect of exchangeable sodium on the physical condition of Sodium-sensitive plants may, however, suffer injury as a result of sodium accumulation in plant tissues when exchangeable sodium values are lower than those effective in causing deterioration of the physical condition of the soil.

LOW-SODIUM WATER (S1)

Can be used for irrigation on almost all soils with little danger of the development of harmful levels of exchangeable sodium. However, sodium-sensitive crops such as stone-fruit trees and advocados may accumulate injurious concentrations of sodium.

M. Conradie **Pr.Sci.Nat.**

Applied Scientific Services: Laboratory Services

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DS52541

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Tel (+264 - 61) 71 2257 Fax (+264 -61) 71 2097

CHEMICAL WATER ANALYSIS REPORT

DETAILS OF SAMPLE:

SAMPLE NUMBER : DS52542
SENDER : Steyn OM
SAMPLE POINT NAME : Farm:Okatombaka No266
AREA DESCRIPTION : -
LOCATION DESCRIPTION : Borehole 2 -
COMMENTS : -

DATE SAMPLE TAKEN : 2019-01-31
TIME TAKEN : -
DATE SAMPLE RECEIVED : 2019-02-01
DATE SAMPLE ANALYSED : 2019-02-05

DETERMINANT :	Value	Units	Classification
pH	6.6		A - Excellent
Conductivity mS/m	64.5	mS/m	A - Excellent
Total dissolved solids calculated from conductivity	432	mg/l	
Sodium as Na	46	mg/l	A - Excellent
Potassium as K	8	mg/l	A - Excellent
Sulphate as SO ₄	54	mg/l	A - Excellent
Nitrate as N	6.8	mg/l	A - Excellent
Nitrite as N	<0.1	mg/l	
Silicate as SiO ₂	66	mg/l	
Fluoride as F	0.6	mg/l	A - Excellent
Chloride as Cl	18.0	mg/l	A - Excellent
Total Alkalinity as CaCO ₃	226	mg/l	
Total Hardness as CaCO ₃	226	mg/l	A - Excellent
Calcium as CaCO ₃	130	mg/l	A - Excellent
Magnesium as CaCO ₃	96	mg/l	A - Excellent
Iron as Fe	0.02	mg/l	A - Excellent
Manganese as Mn	0.01	mg/l	A - Excellent
Turbidity	0.24	NTU	A - Excellent
Colour	7.0	mg/l Pt	Within recommended limit
Boron as B	0.12	mg/l	

REMARKS :

CLASSIFICATION FOR CHEMICAL QUALITY OF DRINKING WATER IN RESPECT OF DETERMINANTS AS ABOVE :
Class A : Suitable for human consumption
Stockwatering : Suitable

M.Conradie Pr.Sci.Nat.
Applied Scientific Services: Laboratory Services
conradiem@namwater.com.na
DS52542

Although Namwater, will endeavour to perform a correct analysis, neither Namwater, or any of its officials shall be liable for damages arising from loss or injury caused directly or indirectly by or contributed by or arising from any inaccuracy of the analysis or the interpretation thereof.



ADDITIONAL INFORMATION : DS52542

Stability pH : 7.40

Langelier Index : -0.80 - Corrosive

Ryznar Index : 8.19 - Corrosive

CORROSIVITY POTENTIAL OF WATER TOWARDS STEEL : 0.36 - Corrosive

IRRIGATION CLASSIFICATION : C2 - S1

MEDIUM-SALINITY WATER (C2)

Can be used if a moderate amount of leaching occurs. Plants with moderate tolerance can be grown in most cases without special practices for salinity control.

SODIUM

The classification of irrigation waters with respect to SAR is based primarily on the effect of exchangeable sodium on the physical condition of Sodium-sensitive plants may, however, suffer injury as a result of sodium accumulation in plant tissues when exchangeable sodium values are lower than those effective in causing deterioration of the physical condition of the soil.

LOW-SODIUM WATER (S1)

Can be used for irrigation on almost all soils with little danger of the development of harmful levels of exchangeable sodium. However, sodium-sensitive crops such as stone-fruit trees and advocados may accumulate injurious concentrations of sodium.

M. Conradie **Pr.Sci.Nat.**

Applied Scientific Services: Laboratory Services

conradiem@namwater.com.na

DS52542

Although Namwater, will endeavour to perform a correct analysis, neither Namwater, or any of its officials shall be liable for damages arising from loss or injury caused directly or indirectly by or contributed by or arising from any inaccuracy of the analysis or the interpretation thereof.

Analytical Report:
Soil Mehlich Analysis

SCS - South Africa (Pty) Ltd. Agricultural Laboratory
REG No: 1949/032643/07 V.A.T REG No: 4560117428
Building H1, AECI Premises,
De Beere Avenue, Somerset
West, 7135.
Phone: +27 21 852-7889,
Fax: +27 21 852-5319

Client: Okkert Steyn
Posbus 32254
Windhoek

Order: JC5718 Okkert Steyn
Received: 30-08-2019

Farm info:

Completed: 06-09-2019
Reported: 06-09-2019

Laboratory ID	Monitor Sample Nr.	Kemp Camp	Depth cm	C %	Tels Test	pH (NCI)	Ul-Saur (EAST) Exc Acid (EAST) cmol(+)/kg	Uitbarebare Plantvoedingstowwe Exchangeable Plant Nutrients										S Wob T Value	BV BS %	Cu mg/kg	Zn mg/kg	Mn mg/kg	Fe mg/kg	B mg/kg	S mg/kg	Digitfield g/cm3
								P Bray1	P Mehlich	K	Ca	Mg	Na	mg/kg	cmol(+)/kg	%TC	mg/kg									
CT19-16775.001	1	Curry Post 1		0.28	6.2	0.00	11	12	136	701	96	8	0.35	3.50	0.79	0.03	4.7	4.67	100.0	0.45	0.78	53.7	43.1	0.06	6.2	1.499
CT19-16775.002	2	Curry Post 2		0.20	5.7	0.00	9	11	74	569	91	7	0.19	2.84	0.75	0.03	3.8	3.81	100.0	0.27	0.48	45.9	46.8	0.05	4.6	1.489
CT19-16775.003	3	Rika Spilpunt		0.20	5.9	0.00	8	10	70	262	165	27	0.18	1.31	0.54	0.12	2.1	2.14	100.0	0.26	0.73	36.6	48.3	0.11	11.0	1.292
CT19-16775.004	4	Klein Drieland		0.24	5.4	0.27	24	29	135	553	107	7	0.34	2.76	0.88	0.03	4.0	4.28	93.6	0.45	0.85	48.7	57.5	0.09	7.3	1.501
CT19-16775.005	5	On Groenland 1		0.36	5.4	0.24	15	9	112	599	124	4	0.29	2.99	1.02	0.02	4.3	4.56	94.7	0.43	0.39	49.9	59.4	0.09	6.4	1.489
CT19-16775.006	6	On Groenland 2		0.20	5.2	0.34	16	33	165	833	160	9	0.42	4.16	1.31	0.04	5.9	6.27	94.6	0.48	1.54	63.5	51.2	0.11	7.3	1.454
CT19-16775.007	7	Bosville SP		0.24	5.5	0.21	40	48	93	342	60	27	0.24	1.70	0.49	0.12	2.6	2.76	92.5	0.27	2.67	32.0	52.5	0.13	9.5	1.350
CT19-16775.008	8	SP A		0.32	6.4	0.00	9	12	122	623	121	33	0.31	3.11	1.00	0.14	4.6	4.56	100.0	0.51	1.44	46.7	46.9	0.17	8.9	1.270
CT19-16775.009	9	SP B		0.36	6.7	0.00	26	29	131	710	146	31	0.34	3.54	1.20	0.13	5.2	5.22	100.0	0.49	1.48	48.9	59.5	0.17	8.7	1.198
CT19-16775.010	10	SP C1		0.40	6.3	0.00	11	13	181	1137	170	68	0.46	5.67	1.40	0.30	7.8	7.84	100.0	0.63	1.08	51.4	46.8	0.18	20.4	1.196
CT19-16775.011	11	SP C2		0.56	6.7	0.00	8	11	118	720	147	72	0.30	3.64	1.21	0.31	5.5	5.48	100.0	0.41	0.97	48.5	43.0	0.15	15.5	1.218
CT19-16775.012	12	SP D1		0.28	7.3	0.00	18	21	104	500	116	38	0.27	2.49	0.86	0.16	3.9	3.88	100.0	0.28	1.70	45.5	40.9	0.16	16.1	1.244
CT19-16775.013	13	SP E		0.24	6.8	0.00	45	53	128	600	114	21	0.33	2.99	0.94	0.09	4.4	4.35	100.0	0.46	3.30	53.2	46.2	0.14	9.2	1.266
CT19-16775.014	14	Rika Drieland		0.28	4.9	0.36	12	14	104	362	69	5	0.26	1.81	0.54	0.02	2.6	3.02	87.5	0.39	0.88	45.2	55.4	0.09	5.9	1.526
CT19-16775.015	15	SP D2		0.32	6.6	0.00	9	11	159	861	172	59	0.159	861	172	59	6.4	6.38	100.0	0.58	1.94	56.4	46.9	0.18	15.2	1.229

Appendix C: Tree Information

Trees recorded in quarter degree squares 2118BA, 2118BB and 2118BD (Curtis & Mannheimer, 2005)

Name	Common Name
<i>Acacia ataxacantha</i>	Flame-thorn
<i>Acacia erioloba</i>	Camel-thorn
<i>Acacia fleckii</i>	Sand-veld Acacia
<i>Acacia hebeclada</i> subsp <i>hebeclada</i>	Candle-pod Acacia
<i>Acacia karroo</i>	Sweet-thorn
<i>Acacia luederitzii</i> var <i>luederitzii</i>	Kalahari Acacia
<i>Acacia mellifera</i> subsp <i>detinens</i>	Blue-thorn Acacia
<i>Acacia tortilis</i> subsp <i>heteracantha</i>	Umbrella-thorn
<i>Albizia anthelmintica</i>	Worm-cure Albizia; Aru
<i>Bauhinia petersiana</i> subsp <i>macrantha</i>	White Bauhinia
<i>Boscia albitrunca</i>	Shepherd's Tree
<i>Burkea africana</i>	Burkea
<i>Catophractes alexandri</i>	Trumpet-thorn; Rattlepod
<i>Combretum apiculatum</i> subsp <i>apiculatum</i>	Kudu-bush
<i>Combretum collinum</i>	Variable Combretum
<i>Combretum hereroense</i> subsp <i>hereroense</i>	Mouse-eared Combretum
<i>Croton gratissimus</i>	Lavender croton
<i>Croton gratissimus</i> var <i>gratissimus</i>	Lavender Croton
<i>Dichrostachys cinerea</i> subsp <i>africana</i>	Kalahari Christmas Tree; Sickle-bush
<i>Diospyros lycioides</i> subsp <i>sericea</i>	Blue Bush
<i>Ehretia alba</i>	White-puzzle Bush
<i>Elephantorrhiza elephantina</i>	Elands-bean
<i>Grewia avellana</i>	Mezunuzvani
<i>Grewia flava</i>	Velvet Raisin
<i>Grewia flavescens</i>	Sandpaper Raisin
<i>Grewia retinervis</i>	Kalahari Raisin
<i>Grewia schinzii</i>	Shaggy Raisin; Rusty-haired Raisin
<i>Gymnosporia buxifolia</i>	Common Spikethorn
<i>Mundulea sericea</i>	Silverbush
<i>Ozoroa paniculosa</i>	Common Resin-bush
<i>Philenoptera nelsii</i> subsp <i>nelsii</i>	Kalahari Omupanda; Kalahari Apple-leaf
<i>Rhigozum brevispinosum</i>	Simple-leaved Rhigozum
<i>Searsia lancea</i>	Sour Karee
<i>Searsia tenuinervis</i> var <i>tenuinervis</i>	Kalahari Currant
<i>Tarchonanthus camphoratus</i>	Camphor Bush
<i>Terminalia sericea</i>	Silver Cluster-leave
<i>Ziziphus mucronata</i>	Buffalo-thorn

Appendix D: Proof of Public Consultation

Registered and Notified IAPs

Title	Name	Surname	Position	Organisation
Mr	Reimar	Schullenbach	Owner	Farm Elandspan
Mr	Bob	Kandetu	Owner	Neighbour
Mr	Arnold	Tjihuro	Owner	Farm Uilpan
Mr	Hartmut		Owner	Farm Magda
Mr	Jaco	Roux	Owner	Farm Vierpanne
Mrs / Mr	Stephnie /Detlev	Roseman	Owners	Farm Tokat
Mr	Udo	Riedel	Owners	Farms Uilpan 731, Bospan 661 and Magda 671
Mr		Shiyenda		Omaheke Regional Council

Comments and Responses Table

IAP	Correspondence	Issue / Concern	Response
Stephanie Rösemann	<i>Email received</i> 21 August 2020	<p>Namibia is a Semi Desert country, where water availability in most parts of the country is limited. Forecasts are stating that Namibia will become drier in future. Great concern is raised that there are no detailed quantifications of water aquifers in the impacted surrounding area and Omaheke region.</p> <p>Concern is raised as to ensure that water subtraction/management will be done sustainably.</p> <p>Concern is raised that a subtraction of large amounts of waters will negatively impact the environment, ecosystem, human existence and therefor the economy as a whole.</p> <p>Omaheke region is known as the "Cattle Country" where the livelihood of farmers are dependent on cattle that utilize the water of the aquifers. Concern is raised that the livelihood of all consumers who are linked to specific underground water aquifers may be affected negatively if water levels are declining due to subtraction of large amounts of water</p>	<p>Noted. Aquifer management and quantification of the resource is the responsibility of the DWA in the Ministry of Agriculture, Water and Land Reform. Based on existing information as provided by the DWA and as supplied by the proponent a hydrogeological assessment was conducted to determine the current sustainability of water resources on the farming unit of the proponent. It is strongly suggested that all farmers conduct borehole monitoring, even if not required by the DWA, in order to develop a database of groundwater levels and abstraction rates and volumes. This will be beneficial not only to the groundwater user him/herself, but also for users of groundwater in the entire basin.</p> <p>The purpose of the EIA and EMP is to ensure that environmental impacts, including those on groundwater availability, are prevented or minimized. The Proponent commissioned the EIA and EMP even though he is not situated in a groundwater control area that requires such assessment. Groundwater level monitoring is proposed in the EMP with water levels indicated at which abstraction should be reduced. See section 10.1.13.</p> <p>The purpose of the EIA and EMP is to ensure that environmental impacts, including those on groundwater availability, are prevented or minimized. The Proponent commissioned the EIA and EMP even though he is not situated in a groundwater control area that requires such assessment. Groundwater level monitoring is proposed in the EMP with water levels indicated at which abstraction should be reduced. See section 10.1.13.</p> <p>The purpose of the EIA and EMP is to ensure that environmental impacts, including those on groundwater availability, are prevented or minimized. The Proponent commissioned the EIA and EMP even though he is not situated in a groundwater control area that requires such assessment. Groundwater level monitoring is proposed in the EMP with water levels indicated at which abstraction should be reduced. See section 10.1.13.</p>

IAP	Correspondence	Issue / Concern	Response
Stephanie Rösemann	<i>Email received</i> 21 August 2020	<p>(this will not only effect neighbours of the above mentioned parties but a much larger area).</p> <p>The effects of large amounts of water subtractions cannot be comprehended fully and are unknown, as long as there are no detailed quantifications of water aquifers and how they are linked to each other.</p> <p>Great concern is raised that strong water at some places suggest that there is a great availability of water in the whole area. Boreholes in close proximity may differ greatly.</p> <p>Borehole monitoring data in the surrounding area show a decline trend of water levels.</p>	<p>See point 1</p> <p>Yes agreed. Thus the need for a hydrocensus and hydrogeological study as indicated in point 1 as well as the need for DWA to do adequate monitoring.</p> <p>Such borehole monitoring data was requested from the Proponent's neighbours and other relevant IAPs during the public consultation phase. No data was however received. In order for holistic investigations into water abstraction and availability it is crucial for all parties to monitor and supply information, especially to the DWA. The data used in the specialist study is clearly referenced and does not indicate a decline in decreasing levels, but rather an increase in level over a 20 year period. Boreholes used by NamWater for water supply in nearby communal areas indicate a drawdown while being pumped yet recovering quickly when not pumped.</p> <p>Aquifer management and quantification of the resource is the responsibility of the DWA in the Ministry of Agriculture, Water and Land Reform. They do have monitoring wells for example in the Omaheke Groundwater Management Basin at Epukiro Post 3, Epukiro Post 10, Plessisplaas, Otjinene, Witvlei and Hochveld state water schemes. It is noted that monitoring at these schemes can be improved.</p> <p>This potential impact is addressed in section 10.1.12.</p>

IAP	Correspondence	Issue / Concern	Response
		<p>aquifers as well as the whole ecosystem.</p> <p>If water resources are depleted (also in future generations) it will degrade the whole ecosystem and economic potential of the area and country will be erased completely. Overutilisation of natural resources in general are a major concern.</p> <p>If water levels are dropping in surrounding areas due to the subtraction of great amounts of water for Crop Cultivation and Related Activities, who will be responsible for drilling deeper boreholes?</p> <p>Great concern is raised that a few people who are residing on strong water aquifers benefit of those, while others loose their livelihood due to the subtraction of great amounts of water.</p> <p>Currently all are tapping in the dark concerning the water aquifers in the Omaheke Region, because there is no reliable data available. Can water subtraction be guaranteed to be sustainable under these circumstances?</p>	<p>Noted. The purpose of the EIA and EMP is to ensure that environmental impacts, including those on groundwater availability, are prevented or minimized. The Proponent commissioned the EIA and EMP even though he is not situated in a groundwater control area that requires such assessment. Groundwater level monitoring is proposed in the EMP with water levels indicated at which abstraction should be reduced. 10.1.13.</p> <p>Assigning of responsibility for such an eventuality falls outside of the scope of the environmental assessment. The mitigation measures as proposed in Section 10.1.13 are aimed at preventing such eventuality from occurring.</p> <p>The mitigation measures as proposed in section 10.1.13 are aimed at preventing such eventuality from occurring.</p> <p>Aquifer management and quantification of the resource is the responsibility of the DWA in the Ministry of Agriculture, Water and Land Reform. Based on existing information as provided by the DWA and as supplied by the proponent a hydrogeological assessment was conducted to determine the current sustainability of water resources on the farming unit of the proponent. As a safety margin, the mitigation measures proposed include reduced abstraction rates by the proponent if the water level decrease to 5 m less than the long term average rest water level of each borehole.</p>

Notification Letter



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

To: Chief Regional Officer
 Omaheke Regional Council
 Gobabis
 Namibia

20 October 2020

Re: Environmental Impact Scoping Assessment and Environmental Management Plan for Crop Cultivation Activities of O. M. Steyn on the Farms Okatombaka No. 266, Bosville Wes No 755, Rika No 266, Omaheke Region

Dear Sir/Madam

Geo Pollution Technologies (Pty) Ltd was appointed by O. M. Steyn to undertake an environmental assessment for the irrigation and associated activities on the Farms Okatombaka No. 266, Bosville Wes No 755, Rika No 266. 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 the Crop Cultivation Activities on Farms Okatombaka No. 266, Bosville Wes No 755, Rika No 266, Omaheke Region

Proponent: O. M. Steyn

Environmental Assessment Practitioner: Geo Pollution Technologies (Pty) Ltd

Collectively the proponent has cleared 97 ha for irrigation. However, only 67 ha are irrigated during one planting season, on a rotational basis. Thus, the effective size of productive, irrigated land during one season is 67 ha and not 97 ha. Pending the outcome of a hydrogeological specialist study, the total hectares of land to be irrigated simultaneously, may be increased. For irrigation, water is abstracted from a number of boreholes under an existing water abstraction permit issued by the Ministry of Agriculture, Water and Forestry. An additional water allocation will be applied for. The main produce include maize, wheat and moringa. These are harvested and the moringa packaged on the farm before being transported to various markets. 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, fuel storage and use, staff accommodation and effluent disposal.

The Regional Council is invited to register with the environmental consultant to receive further documentation and communication regarding the project. By registering, the Regional Council will ensure the correct contact person to whom information may be sent and will be provided with an opportunity to provide input that will be considered in the drafting of the environmental assessment report and management plan.

Please register by either by **Fax:** 088-62-6368 or **E-Mail:** quzette@thenamib.com. Should you require any additional information please contact Geo Pollution Technologies at telephone 061-257411. Your time and consideration regarding the matter is much appreciated.

Sincerely,

Geo Pollution Technologies

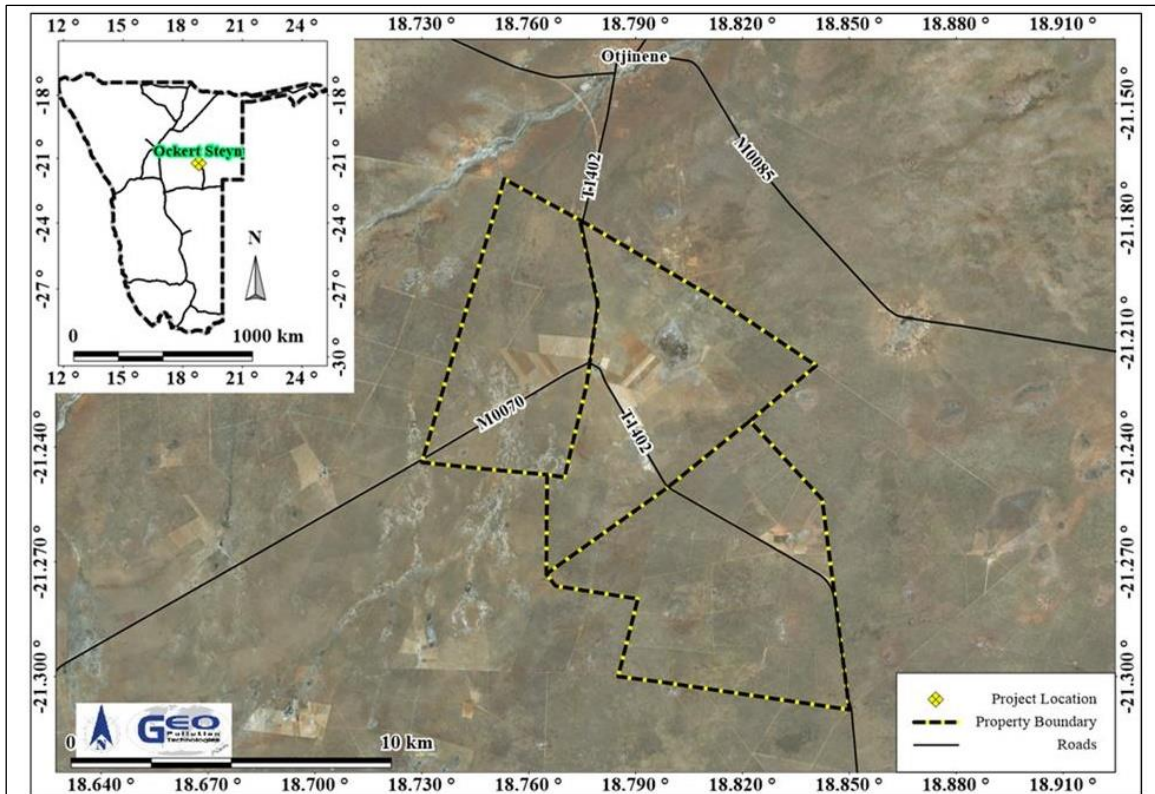
Quzette Bosman

Social and Environmental Assessment Practitioner

Page 1 of 3

Directors:

P. Botha (B.Sc. Hons. Hydrogeology) (Managing)



Project Location

Background Information Document



TEL.: (+264-61) 257411 ♦ FAX.: (+264) 88626368

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PO BOX 11073 ♦ WINDHOEK ♦ NAMIBIA

E-MAIL: gpt@thenamib.com

BACKGROUND INFORMATION DOCUMENT

Environmental Scoping Assessment and Environmental Management Plan for Irrigation Activities on the Farms Okatombaka No. 266, Bosville Wes No. 755, Rika No. 266, Omaheke Region

1. Introduction

Geo Pollution Technologies (Pty) Ltd was appointed by O. M. Steyn (the proponent) to undertake an environmental assessment for his irrigation activities on the Farms Okatombaka No. 266, Bosville Wes No. 755 and Rika No. 266 (Figure 1). Collectively the proponent has cleared 97 ha for irrigation. However, only 67 ha are irrigated during one planting season, on a rotational basis. Thus, the effective size of productive, irrigated land during one season is 67 ha and not 95 ha. Pending the outcome of a hydrogeological specialist study, the total hectares of land to be irrigated simultaneously, may be increased. Approximately 300 ha is used for dryland agriculture.

The main produce are maize, oats and moringa. Irrigation is from production boreholes by means of centre pivot and drip irrigation systems.

The environmental assessment will include all operational activities associated with the agricultural activities of the proponent and includes fuel storage.

An Environmental Clearance Certificate (“ECC”) for the operations is required as per the Environmental Management Act No. 7 of 2007 (“EMA”). A Scoping Environmental Assessment Report (“SR”) and an Environmental Management Plan (“EMP”) are proposed to be submitted to the Ministry of Environment, Forestry and Tourism’s Department of Environmental Affairs (“DEA”) in support of an application for an ECC.

2. The purpose of this document

With this Background Information Document (“BID”), GPT aims to provide Interested and Affected Parties (“IAPs”) with information about the project and interact with them regarding it. IAPs are therefore invited to register with GPT for the project in order to:

- ♦ Provide GPT with additional information which should be taken into account in the assessment of impacts;
- ♦ Share any comments, issues or concerns related to the project; and

- ♦ Review and comment on the reports (SR and an EMP).

3. Project Description

Activities associated with the project have been divided into the following phases: Planning, maintenance/construction, operational and the decommissioning phase. A brief outline of expected activities for each phase is detailed below.

3.1 Planning Phase

While planning for operations, construction/maintenance activities and decommissioning of the farm, it is the responsibility of the 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. Typical planning activities include:

- ♦ Obtain permits and approvals from local and national authorities including Ministry of Agriculture, Water and Land Reform.
- ♦ Make provisions to have a Health, Safety and Environmental Coordinator to implement the EMP.
- ♦ Ensure provisions for a fund to cater for environmental incidents risks/pollution and ecological restoration are made.
- ♦ Ensure all appointed contractors and employees enter into an agreement which includes the EMP.
- ♦ Establish and/or maintain a reporting system to report on aspects of construction activities, operations and decommissioning as outlined in the EMP.

3.2 Maintenance / Construction Phase

Maintenance continues on a daily basis and may include some construction activities. Maintenance include minor repairs to infrastructure, general upkeep of buildings including painting and servicing of vehicles, etc.

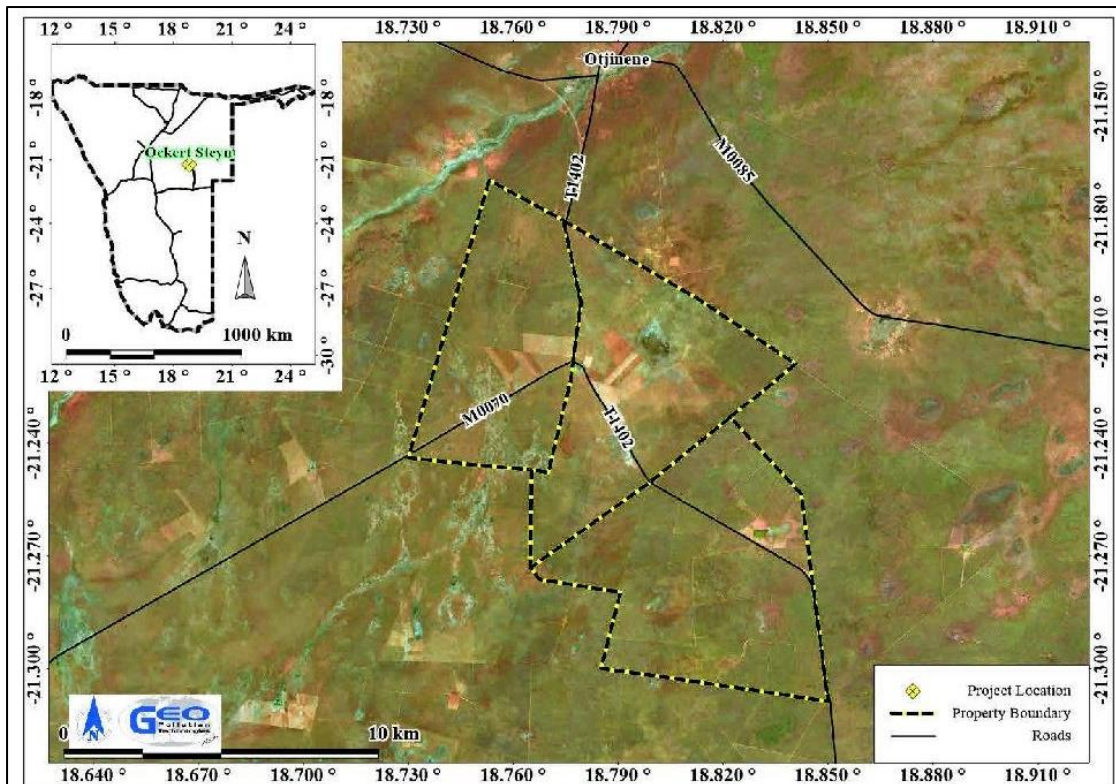


Figure 1: Project Location

3.3 Operational Phase

The main operational activities include: land clearing and preparation; planting; water abstraction and irrigation; pest control; harvesting; and processing and packaging. Crops are cultivated on a rotational basis. A consumer fuel installation is present on site to supply diesel to tractors and other vehicles.

3.4 Decommissioning Phase

Decommissioning is not foreseen during the validity of the environmental clearance certificate. Decommissioning will however be assessed. Should decommissioning occur at any stage, rehabilitation of the area may be required. Decommissioning will entail the complete removal of all infrastructure including buildings and underground infrastructure. Any pollution present on the site must be remediated.

4. Preliminary Identified Impacts

During the environmental assessment all components of the environment will be considered, however only those components which are being impacted on significantly or are deemed to be sensitive will be assessed. These include the following:

- ◆ Health and safety risks,
- ◆ Soil and groundwater pollution.
- ◆ Over abstraction of groundwater,
- ◆ Fire risks,
- ◆ Waste and effluent generation and disposal,
- ◆ Traffic,
- ◆ Noise,
- ◆ Visual impact,
- ◆ Ecosystem and biodiversity impacts,
- ◆ Socio-economic contributions.

5. Getting Involved

GPT invites all IAPs to provide in writing, any issues and suggestions regarding the development. This correspondence must include:

- ◆ Name and surname,
- ◆ Organization represented or private interest,
- ◆ Position in the organization,
- ◆ Contact details, and
- ◆ Any direct business, financial, personal or other interest which you may have in the approval or refusal of the application.

All contributions become public knowledge and will be circulated along with the reports as per the EMA requirements.

The comments, inputs and suggestions will also be submitted to the DEA along with how any issues have been addressed in the SR.

The public participation process will remain ongoing during the environmental assessment. However, all comments and concerns should be provided to GPT by 21 August 2020 to ensure incorporation into the final report.

The project team may be contacted on the contact details below.



Geo Pollution Technologies (Pty) Ltd.

Telephone: (+264-61) 257411

Fax: (+264) 88626368

e-mail: gpt@thenamib.com

Your rights as an IAP according to the Environmental Management Act, No7 of 2007, Government Notice No 30 (Environmental Impact Assessment Regulations)

Section 23:

(1) A registered interested or affected party is entitled to comment in writing, on all written submissions made to the Environmental Commissioner by the applicant responsible for the application, and to bring to the attention of the Environmental Commissioner any issues which that party, believes may be of significance to the consideration of the application, as long as -

(a) comments are submitted within 7 days of notification of an application or receiving access to a scoping report or an assessment report;

(b) the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application.

(2) Before the applicant submits a report compiled in terms of these regulations to the Environmental Commissioner, the applicant must give registered interested and affected parties access to, and an opportunity to comment in writing on the report.

(3) Reports referred to in sub regulation (2) include-

(a) scoping reports;

(b) scoping reports amended and resubmitted;

(c) assessment reports; and

(d) assessment reports amended and resubmitted.

(4) Any written comments received by the applicant from a registered interested or affected party must accompany the report when the report is submitted to the Environmental Commissioner.

(5) A registered interested or affected party may comment on any final report that is submitted by a specialist reviewer for the purposes of these regulations where the report contains substantive information which has not previously been made available to a registered interested or affected party.

Section 24:

The applicant responsible for an application must ensure that the comments of interested and affected parties are recorded in reports submitted to the Environmental Commissioner in terms of these regulations, and comments by interested and affected parties on a report which is to be submitted to the Environmental Commissioner may be attached to the report without recording those comments in the report itself.

Advertisements



Sun

WEDNESDAY 5 AUGUST 2020 NEWS

3

• GANJA USERS SAY POLICE OFFICERS ABUSE CITIZENS BECAUSE OF PALTRY SALARIES

PAY THEM: The Ganja Users Association of Namibia says police officers should be paid more. PHOTO: NAMPA

GUN president Borro Ndungula says the low salaries police officers earn is the why they subject members of the public to abuse.

OGONE TLHAGE WINDHOEK

The Ganja Users Association (GUN) of Namibia has encouraged government to pay members of the police service more. This call was made during a recent demonstration to denounce

the treatment members of the public experience at the hands of the police.

The organisation's president Borro Ndungula said the low salaries police officers earn is the reason why they subject members of the public to abuse. "Maybe some of the reasons they

are beating people is because they are underpaid. We are calling on the line ministry or the inspector-general to give the police a raise," he said.

"We know that police officers do not have houses and such, but they provide an essential service. This is also why we are calling for a raise," he added.

Apartheid laws

The association urged the police not to use apartheid-era laws in the

execution of their duties.

"How is it that our police officers are made to enforce apartheid-era laws that in ways violate people's rights and freedoms, which are guaranteed to all Namibian citizens by the supreme law, the constitution? The very same document every man and woman in uniform swore to protect, defend and uphold?" Ndungula said.

The association also accused police officers of taking the law into their own hands during the

execution of their duties.

"Allegations of police brutality in all regions of Namibia continue despite a stern warning from President Hage Geingob," Ndungula said. According to him, those who act brutally often do not account for their actions.

"Nationwide police brutality and killings have been rampant against civilians by police officers. Police officers continue to shoot unarmed civilians, with little, and in most cases, no consequences," he said.

Erongo travel permits still on the table

ADOLF KAURE SWAKOPMUND

A notice displayed in one of the Swakopmund police station's windows was removed on Saturday after it created uproar amongst the town's residents.

On the 'Namibians United Against Lock-down' Facebook group, Hannelie Horn Turner expressed her disapproval regarding the notice, which read: "No permits will be issued until further notice. The

public is encouraged to stay home and stay safe. Thank you."

"I suppose this means we are now officially prisoners," she wrote.

She also sent a message to Erongo 24/7's Facebook page to voice her frustration, adding that the notice was placed in the window on Saturday at 09:50.

Meanwhile, a police officer on duty who chose to remain anonymous, later removed the notice, saying residents are allowed to apply for travel permits.

"The notice was put on the window earlier in the year and it is old. It is not even supposed to still be on the wall, so let me remove it now."

"People have been queuing up for permits, even on Friday, and they are allowed to apply for travel permits," she said.

When approached for comment, Inspector Il-eni Shapumba, the police unit commander of community affairs for the region, reiterated that residents can apply for permits to travel out of Swakopmund. "We

are issuing travel permits strictly in line with the law," he said.

Shapumba made these remarks after consulting with the Swakopmund police station command-

er. Last Friday, President Hage Geingob urged the Erongo Region and the country's citizens to avoid unnecessary travel.

He made these remarks during a statement on the country's Covid-19

response. "I hereby inform the nation that the Erongo Region and the special dispensation for the local authority areas of Walvis Bay, Swakopmund and Arandis will

remain unchanged and is hereby extended from Tuesday, 4 August, until midnight Monday, 31 August 2020."

adolff@erongo.com.na



MISLEADING: A notice on the window of the Swakopmund police station created confusion on social media. PHOTO: ADOLF KAURE

PUBLIC PARTICIPATION NOTICE

ENVIRONMENTAL ASSESSMENT: IRRIGATION AND RELATED ACTIVITIES ON VARIOUS FARMS IN THE OMAHEKE REGION

Geo Pollution Technologies (Pty) Ltd was appointed by O. M. Steyn, Hanzu Investments CC, E. van Niekerk v/a Vision Farming and N. Steenkamp (the proponents), to undertake environmental assessments for crop cultivation and related activities on the farms: Springvale No. 337, Okatambaka No. 266, Bosville Wes No. 755, Rika No. 266, Tokat No. 343, Conellan No. 247, Owingi No. 246 Okasondani No. 264, Evare No. 265 and Okatjukur No. 263 in the Omaheke Region. The detailed project locations may be viewed at: <http://www.thenamib.com/projects/projects.html>

The environmental assessments will be conducted according to the Environmental Management Act of 2007 and its regulations as published in 2012.

The proponents currently irrigate land by means of drippers, sprinklers and centre pivot systems. For irrigation, groundwater is abstracted from boreholes. All boreholes used for irrigation will be registered with the Ministry of Agriculture, Water and Land Reform. The main produce are maize, wheat, oats and moringa.

All Interested and Affected Parties are invited to register with the environmental consultant. By registering you are provided with the opportunity to share any comments, issues or concerns related to the project, for consideration in the environmental assessments. Additional information can be requested from Geo Pollution Technologies. All comments and concerns should be submitted to Geo Pollution Technologies by 21 August 2020.

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The politics of accidental opinion remarks on Fishrot

OPINION

TOBIAS NANDE NANDJIGWA

Accidental opinion of the day was first echoed by the author of the American Declaration of Independence, Thomas Jefferson.

In 1789, 12 years after American independence, Thomas Jefferson cemented the psychology behind the expression of accidental opinions through a self-dialogue between his 'Heart and the Head'. His dialogue educates us that situations often produce a crisis of clinging to what is dearest to a being. Hence, the head absorbs the heart but the heart keeps on beating in the mind. Thus, the Bible verse: "Out of the abundance of the heart the mouth speaks." (Matthew 12v34)

So, the above is the premise through which one can filter to understand Swapo's position on the Fishrot scandal.

Lately, the remarks of accidental opinions and from the least expected questions and answers by Namibia's executives speak more volumes than the official written correspondences.

"I don't think they are guilty," was a recent accidental remark by President Hage Geingob, referring to the Fishrot accused. Even if he subsequently corrected it to mean innocent until proven guilty, it did not happen in a vacuum but in a quantum of psychological intent at influencing that perception.

If there are unhitched legal or ethical boundaries to bear undue influence on a matter that is before a court (Samerji Fishrot) through any commentaries by President Hage Geingob and Prime Minister Saara Kuugongelwa-Amadhila, then their zeal to midwife the term and defend it as "a so-called Fishrot"

(Sona, parliament, 2020) fuel a cynical appeal harbouring an undue prejudice and influence that they are indeed claiming to avoid.

"So-called Fishrot" is a flash-point and rightly so a directional difficulty in itself: the perfect phraseology in seeding up a conspiracy to galvanise the dark force against the scandal's graphic details in the light. It exposes the underbelly's first tender piece of the executive's weight in being complicit.

The language used by these political players creates an unnecessary conundrum of reducing something (global scandal) to simply nothing and discreetly influencing the public narrative of Fishrot at a time when we are living at the edge of the post-truth Fishrot environment.

As Nigerian Nobel Laureate Wole Soyinka once said, "Language can be an instrument

of war". Beautifully crafted words can shape lives and a single pronouncement can stir conviction and change the face of a nation.

Such remarks of accidental opinion by state actors qualify to serve to decrease the likelihood of investigators and the jury of the court to act upon independently if not unbiased against the top executive wishes. It premises to destroy the Fishrot power it carries in identifying where all the illicit proceeds got stuck. It also reduces the seriousness in fronting the corruption fight in this particular case. It signalled that our leaders are operating under a different stimulus that defies analysis of Fishrot reality and that of the nation at large.

Another remark with a harmonic beat joined the fray from Netumbo Nandi Ndaitwah, minister of foreign affairs, when she told the world that "the Fishrot Saga had been spoken about too much and must be left in the hands of authority" (parliament, NBC live stream, 2020).

It's unacceptable for her to dictate quietness in the court of public opinion. Netumbo's pronouncement simply sharpened the irony and intensified the pain of people.

She is willing to put the truth to sleep even if it just rose to the light. Hers is simply a sceptical protective device to forget a scandal since she is from the exile school of thought where "there is no comfort in the truth".

There is a clear insensibility located and grounded in the conviction of either abetting, hiding, avoiding or concealing, prime minister and foreign affairs minister because their counterpoint remarks are a barometer that does not preserve the sanctity, safety and comfort of the state, nor displays the intellectual capital that marvel stewardship glory, tender, devotion, and decency amidst a scandal of this magnitude. Their remarks instead translate into a distraction that undercuts the prospects to exhaust all our bases in fighting the Fishrot saga, given their influential voices as state actors.

The attitude on a display is nothing but an overt softening of a crime (scandal) with an artificial hypersensitivity of downplaying it without acknowledging it since their harmonic remarks are not saying anything but they are taking away the nation's

instinct that comes with the sociology around the Fishrot scandal. Why the reluctance to offend the Fishrot culprit by the top Namibian leadership?

It seriously depicts an attitude that is hard to fathom but yet easily compatible to link all these accidental opinions in the catapulting removal of the country's chief criminal investigator, Commissioner Nelius Becker (Police chief investigator moved to forestry, *The Namibian* 2020) and the shameless senseless removal of Hannu Shipena (Intelligence official replaces ACC executive director, *The Namibian*, 2020) in a wolf pack model-style to make it look like the proactive, outspoken Shipena is not the main target; a retribution for speaking out against government underfunding the graft watchdog.

In the realm of spotting out the recipients of Fishrot proceeds elements in its functional ranks, the question for the ruling Swapo leadership is from the Nigerian Yoruba tribe asking, "How many teeth do we have to count in the multiple layers of a dental deformity?"

"Tobias Nande Nandjigwa is a social science educator."

The criminalisation of poverty in Katutura

OPINION

ELIFAS HELAO NGHITOMOKA

Have you ever wondered why there is always a large police presence visible in Katutura and not in other parts of Windhoek? The poor are being monitored constantly.

A simple conclusion is that if you have a higher presence of police in one area, more incidents will be reported. A

false narrative is drawn that crime is higher in that area.

Many minor infractions, that in other areas would not be picked up, are reported in informal settlements, placing young lives into a criminal justice system that does not rehabilitate, but instead churns out hardened criminals.

The masses in Havana, Goreangab and Babylon

have been living without basic services and have petitioned the City of Windhoek several times.

We were told there is no budget, yet the City of Windhoek seeks sponsorship from the Road Fund Administration for more police cars.

Did the City seek sponsorship for ablution facilities to service informal areas? Where is the appeal for donations to provide infrastructure for the street vendors?

Will the new police cars be available for our vendors to sell from? Will they be available for our people when they cannot afford the taxi money to get to work or the hospital?

Will they provide light at night when our children need to study? Will they help people fetch water easily? Will they be there to protect

our women and young girls who get raped in the riverbeds or in the bushes when they use these as toilets?

Create opportunities
If the City is really serious about crime prevention, the best strategy is to create opportunities for all its inhabitants.

With electricity at home, the youth will be able to study without fear of knocking over a candle. They will go to university and prosper; they will not have time to engage in crime.

With land, people will be able to run their businesses without fear of eviction. They will start building their houses and employ others.

Disinterested in solving problems
The City seems disinterested in solving the problems

of the poor, as clearly demonstrated when they arrested six citizens who were erecting a shack for a homeless man. City Police is not interested in protecting the poor, but rather enforcing arbitrary mandates that do not serve in the best interests of our community.

The City is expected to provide a conducive environment for all its inhabitants and having more police cars will not solve the crime problem. In fact, more crime will continue to emerge as long as what leads to crime is not addressed.

It is time the City looks at the majority of its residents as productive citizens, not only as a burden on resources.

We are people, we are residents of Windhoek, we are Namibians, and just because we live in a poor settlement

does not mean we are poor in mind. We too can think for ourselves; we too contribute meaningfully to this city.

It is us who sweep the streets, allowing Windhoek to be declared one of the cleanest cities in Africa.

It is us who build the roads that allow everyone to travel through this great city and this land.

It is us who ensure businesses are safe and houses are clean and schools are painted. The City must create an environment for collaboration. With our unique skills and talents, we are more than ready to move our city forward.

"Elifas Helao Nghitomoka is a community activist and a resident of Havana in the Samora Machel constituency. He is a member of the Students Christian Movement."

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IRRIGATION AND RELATED ACTIVITIES ON
VARIOUS FARMS IN THE OMAHEKE
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WEER

WEERWAAK: Koue toestande sal in die Suid voorkom.
BINNELAND: Sonrig en matig in die Suid. Elders sal dit sonnig en warm tot baie warm wees.
KUS: Gedeeltelik bewolk en koud tot matig met miskolle plek-plek.
GETYE BY WALVISBAAI: H 09:13 L 15:01 H 21:41

VOORUITSIGTE

WINDHOEK	8°	26°
GOBABIS	5°	28°
KATIMA MULILO	9°	31°
KEETMANSHOOP	3°	19°
MARIENTAL	3°	23°
OJUWO	8°	31°
OSHAKATI	10°	32°
REHOBOTH	6°	26°
RUNDU	8°	30°
WALVISBAAI	7°	21°
JOHANNESBURG	6°	24°
KAAPSTAD	12°	15°

Covid-19: Verkiesings

VAN BL. 1

Dit is volgens hom 'n moontlike aanduiding van hoe deurdag die plan is. Naas om daarop aan te dring dat alle rolspelers by die nasionale regulasies hou om die verspreiding van die siekte te bestry, sal gevelde ook kom vir politieke partye wat agente afvaardig wat as kweesbaar beskou kan word, veral weens hul ouderdom.

Mujoro sê van die voorbereidingsprosesse, soos die opleiding van kiesbeampies, moet in persoon geskied.

"Verskeie geleenthede onder meer die registrasie van kiesers, die opleiding van verkiesingsamptenare en politieke veldtogte vereis mense om in nabye kontak te wees. Die strategie beoog om oordrag te verhoed en mense teen die virus te beskerm,"



Mr. Theo Mujoro FOTO WERKSAF

het Mujoro Vrydag gesê. Van die kwelpunte sluit in wanneer iemand wat stemgeregtig is op stembad in kwarantyn of isolasie sal wees.

Die plan, sê Mujoro, is om dié mense wel te bereik en beampies sal toegerus wees met persoonlike beskermende drag (PPE's).

Hulle besef eweneens dat die perk op die aantal mense wat tans geld – 100 vir die 13 streke en 50 en tien vir

onderskeidelik Erongo en die drie geraakte areas (Walvisbaai, Swakopmund en Erongo) – kan mense ook op stembad ontmoedig om hul demokratiese reg uit te oefen.

'n Aanvullende registrasieproses word vir 7 tot 15 September beplan. Kragtens 'n hooggeregshofuitspraak van vroeër vanjaar mag elektroniese stemtoestelle (EVM's) net weer in 'n nasionale verkiesing gebruik word, mits dit vergesel word met 'n naspeurbare papierspoor.

Tjipueja het vroeër gesê dit is nie in dié stadium 'n lonende moontlikheid nie.

Derhalwe sal vanjaar se beplande verkiesings by wyse van tradisionele stembriewe geskied.

"Ons glo dat die land steeds 'n suksesvolle verkiesing kan hou as belanghebbendes elkeen 'n bydrae lewer en almal die strategie ter harte neem," het Tjipueja gesê.

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Sluit van howe in openbare belang - Dausab

Regter blootgestel

Ofskoon 'n regsbeampie onlangs in kontak was met 'n bevestigde Covid-19-geval, werp die regbank alles in die stryd vir die voortsetting van hofverrigtinge.



Die minister van justisie, me. Yvonne Dausab. FOTO STAATSHUIS

Denver Kisting

Me. Yvonne Dausab, die minister van justisie, sê hoewel hofdienste, wat 'n integrale deel van geregtigheid vorm, beperk sal wees vanweë beskikbaarheid van personeellede, sal dit nie tot stilstand kom nie.

Sy het gereageer op nuus dat 'n regter onlangs in kontak gekom het met 'n bevestigde Covid-19-geval by die boekbekenstelling van die regter-president en adjunkhoofregter Petrus Damaseb.

Dausab het Maandag by navraag gesê: "Soos dit was tydens die inperkings sal sekere dienste steeds voorkeur en toegang tot howe geniet, soos kinder-angeleenthede, sake van huishoudelike en seksuele geweld, eerste verskynings en dringende sake en appêlle."

Die huidige toedrag van sake skep naas die uitdagings wat dit teweeg bring ook moontlikhede, sê die justisiminister.

sê Dausab. Nou is ook 'n geleentheid vir diegene wat nie in kwarantyn of isolasie is nie om hulle kolleegas by te staan, sê sy.

Die regbank sê by monde van sy woordvoerder, mnr. Oeckert Jansen, alle regters wat Damaseb se boekbekenstelling bygewoon het, het deurgaan maskers gedra.

Net een van hulle het kontak gehad met die bevestigde geval, sê Jansen.

Regters van die hooggeregshof werk in elk geval tans van die huis af, omdat hul volgende hofittings eers vir Oktober vanjaar geskeduleer is, sê die woordvoerder.

"Wat die hoërhof betref, selfsleer sommige regters en personeellede vanweë dié positiewe geval van 'n persoon wat (sowat) 'n week gelede aangeteken is. Die meeste regters gaan aan met hul normale pligte en werk met van die huis af indien hulle geen sake het om aan te hoor nie."

NIE GESTOP NIE

Jansen gee vir Dausab gelyk dat "die werksaamhede van die hoërhof en die hooggeregshof nie gestop het nie, maar word sonder twyfel geraak deur die algemene styging in die aantal Covid-19-gevalle in die land".

Sedert Maandag is die landdroshof op Walvisbaai, Katima Mulilo en in Windhoek weer oop.

Dit kom nadat die kantoor van die regbank onlangs die tydelike sluiting van dié howe aangekondig het, omdat beampies en beskuldiges positief getoets het vir Covid-19, sê Jansen.

Volgens hom is alle nodige reëlings getref om die veiligheid van regsbeampies, personeellede, hofbeampies en die publiek te verseker.

Jansen sê: "Die howe vorm 'n integrale deel van die samelewing wat verseker dat regsreëls in stand gehou word en die administrasie van geregtigheid op 'n vrye, regverdige en onpartydige manier kan geskied."

"Dit is waarom die howe nie eens tydens 'n noodtoestand vir 'n lang tydperk kan sluit nie, omdat dit 'n negatiewe impak op die lewens van Namibiërs sal hê."

- denver@republikein.com.na

Styging in Windhoek se gevalle 'wek kommer'

VAN BL. 1

Die minister sê tans is vyf mense uiters siek; een in Khomas en vier in die Erongostreek. Ses is kritiek; vier in Khomas en twee in Erongo. Die aantal bevestigde Covid-19-gevalle in die land staan tans op 3 229 waarvan 2 495 gevalle aktief is. Die sterftesifer is steeds op 19 en tans is 1 605 mense in kwarantyn in geriewe oorloord die land. Tot op hede is 36 287 weefselmonsters getoets, met die Universiteit van Namibië se mediese skool wat nou ook toetsing doen.

Intussen het die waarnemende uitvoerende hoof van die Namibië Instituut vir Patologie (NIP), dr. David Uirab, in 'n onderhoud met Republikein erken 'n groot agterstand met toetsing

word steeds ervaar. Uirab het dit as 'n "voortdurende stryd" beskryf. Volgens hom is die standaard van 540 toetse per dag tot 720 by NIP verhoog, terwyl Pathcare se toetse nog bereken moet word.

Die Universiteit van Namibië se mediese skool en Namdeb op Oranjemund het intussen ook met toetsing begin.

PLANNE

Volgens Uirab ontvang NIP tot 1 600 toetse op 'n dag, meer as wat hulle in 24 uur kan verwerk. NIP se laboratoriums op Keetmanshoop, Oshakati en Walvisbaai kan ook nou vir Covid-19 toets, terwyl pogings onderweg is om laboratoriums op Katima Mulilo, Rundu, Onandjokwe en Otjiwarongo te betrek.

Met verwysing na die tydperk van kwarantyn en isolasie wat verkort is en 'n tweede negatiewe toets

wat nie meer nodig is om ontslaan te word nie, sê Uirab hy verag dit sal "hoepelik in twee weke" 'n positiewe uitwerking op die verwerking van toetse hê.

Met verwysing na die toets vir teenliggaampies teen die siekte by persone wat van Covid-19 herstel het, het hy gesê NIP is slegs by die diagnostiese proses betrokke.

"Dit is deel van die ministerie van gesondheid en maatskaplike dienste se openbare reaksie tot die siekte en hang onder meer van die vlak van blootstelling af," het hy gesê.

Namibië se bevestigde gevalle was Maandag 0,1% van die totale bevolking teenoor die 0,9% van Suid-Afrika, wat beteken Suid-Afrika het per capita nege keer meer gevalle as Namibië.

Die buurland se sterftesifer uit bevestigde gevalle is 1,9% teenoor Namibië se 0,6%.

- henriette@republikein.com.na

PUBLIC PARTICIPATION NOTICE

ENVIRONMENTAL ASSESSMENT UPDATE: OPERATIONS OF THE ZAMBIA DRY PORT FACILITY IN THE PORT OF WALVIS BAY

Geo Pollution Technologies (Pty) Ltd was appointed by Africa Union Financial Services (Pty) Ltd to update their existing environmental assessment and environmental management plan. Background information for the project, containing a location map, is available at: www.thenamib.com/projects/projects.html

The update of the environmental assessment will be according to the Environmental Management Act of 2007 and its regulations as published in 2012.

Africa Union Financial Services acts as a logistic hub, not only for cargo to and from Zambia, but for other SADC countries as well. The update is required to include the handling and storage of various types of cargo at both their sites in the Port of Walvis Bay, including but not limited to, containers, reefer containers and the handling and bagging of commodities, including hazardous cargo.

All interested and affected parties are invited to register with the environmental consultant. By registering you are provided with an opportunity to share any comments, issues or concerns related to the facility, for consideration in the updated environmental assessment. Additional information can be requested from Geo Pollution Technologies.

All comments and concerns should be submitted to Geo Pollution Technologies by 27 August 2020.

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PUBLIC PARTICIPATION NOTICE

ENVIRONMENTAL ASSESSMENT: IRRIGATION AND RELATED ACTIVITIES ON VARIOUS FARMS IN THE OMAHEKE REGION

Geo Pollution Technologies (Pty) Ltd was appointed by O. M. Steyn, Hinz Investments CC, E. van Niekerk via Vision Farming and N. Steenkamp (the proponents), to undertake environmental assessments for crop cultivation and related activities on the farms: Springvale No. 337, Okatambaka No. 266, Bosville Wes No. 755, Rika No. 266, Tokat No. 343, Conellan No. 247, Owingi No. 246 Okasondana No. 264, Eware No. 265 and Okajikuri No. 263 in the Omaheke Region. The detailed project locations may be viewed at: <http://www.thenamib.com/projects/projects.html>

The environmental assessments will be conducted according to the Environmental Management Act of 2007 and its regulations as published in 2012.

The proponents currently irrigate land by means of drippers, sprinklers and centre pivot systems. For irrigation, groundwater is abstracted from boreholes. All boreholes used for irrigation will be registered with the Ministry of Agriculture, Water and Land Reform. The main produce are maize, wheat, oats and moringa.

All Interested and Affected Parties are invited to register with the environmental consultant. By registering you are provided with the opportunity to share any comments, issues or concerns related to the project, for consideration in the environmental assessments. Additional information can be requested from Geo Pollution Technologies. All comments and concerns should be submitted to Geo Pollution Technologies by 21 August 2020.

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» Onmin in literêre bedryf oor noodfonds

‘Verligtingsplan vir kunste is onprakties’

Verskeie plaaslike kunstenaars, spesifiek letterkundiges, is glo ongelukkig met die wyse waarop die Kunsteraad die noodfonds bestuur.

Yandi du Plessis

Die Covid-19-noodfonds vir kunste is net nóg ’n onpraktiese projek wat meer geld in die Namibiese Kunsteraad (NACN) stort, terwyl dié instelling reeds fondse het wat onderbuig is nie reg bestuur word nie.

Só sê mnr. Joseph Keamogetsi Molapong, ’n digter, dramaturg en regsadviseur. In sy sosiale media-inskrywings sedert die aankondiging van die verligtingsplan op noodfonds vir plaaslike kunstenaars, maak hy geen geheim daarvan dat hy ontvrede is met die wyse waarop die NACN dié inisiatief bestuur nie.

“Die struktuur wat ingestel is vir die beoogde Covid-19-verligtingsfonds vir kunstenaars, is ’n herhaling van ’n soortgelyke wanfunksionele struktuur wat deur die Kunsteraad gebruik word. Dit is nie funksioneel nie, want dit spreek nie die behoeftes van kunstenaars in Namibië aan nie.

“Soos dit nou gaan, sal dié fondse nie aan die einde van die proses die kunstenaars bereik nie. Hoeveel het die kunstenaars al werklik sedert die aankondiging van die verligtingsplan ontvang? Die burokratiese proses beste reeds geld namens die kunstenaars en die fondse wat bedoel is vir die verligting van kunstenaars se finansiële las. Dit is ’n feit, gebaseer op realiteite: Bale kunstenaars sal nie baat vind by die Covid-19-verligtingsfonds nie,” het hy aan Republikein gesê.

Molapong is ’n lid van Township Productions, ’n teaterproduksie- maatskappy wat in 2001 op die been gebring is in poog om kwesies soos armoede en ’n gebrek aan onderwys aan te spreek en terselfdertyd maatskaplike en kulturele



Me. M'kariko Amagulu, adjunkdirekteur van onderwys, kuns en kultuur. FOTO ARGEF

ontwikkeling in gemarginaliseerde gemeenskappe, hoofsaaklik informele nedersettings, aan te moedig. Die maatskappy lewer al jare lank ’n bydrae in die bevordering van poësie.

LETTERKUNDE

Molapong se Township Productions gaan nie aansoek doen vir die noodfonds nie, want hulle voel daar sal niks van kom nie.

“My probleem met die NACN gaan spesifiek oor letterkunde, wat sedert die herinstelling van die NACN op die kantlyn geplaas is. Dit word selfs uit die huidige reëling gestuit. Die vraag is hoekom? Ons as skrywers kry altyd die idee dat ons werk as ’substandaard’ gesien word.

“Hulle het onder mekaar besluit letterkunde is te ingewikkeld om gefinansier te word. Hulle kies om nie baie skrywers en akademies by die gesprek te betrek nie. Vandaar dat literatuur aan sy lot oorgelaat word. In teenstelling met hulle idees en besluite, word sommige van die substandaard-literatuur by sekondêre skole gebruik en by Namibiese universiteite ontleed. Buite Namibië se grense word dié substandaard-letterkunde waardeur vir die bydrae tot die wêreldliteratuur,” sê hy.

Die NACN is volgens Molapong

bewus van dié griewe. “Ons het soveel gesprekke met mnr. Patrick Sam, voorsitter van die NACN, gevoer; selfs voor die Covid-19-verligtingsfonds aangekondig is.” Dié gesprekke handel hoofsaaklik oor die NACN se finansiering, of gebrek daaraan, spesifiek vir plaaslike letterkunde.

Daar is soveel kunstenaars wat oor die algemeen ontvrede met die NACN is en met betrekking tot die verligtingsfonds het hulle geen vertroue dat die NACN die finansiering vir die kunstenaars gaan deurvoer nie.

Me. M'kariko Amagulu, adjunkdirekteur van onderwys, kuns en kultuur, het op dié aantygings gereageer deur te sê die NACN het wel die finansiering van literatuur opgeskort omdat hulle nie die vermoë gehad het om literatuurvoorleggings te evalueer nie.

Die opskorting was hoofsaaklik op publikasie en drukwerk gefokus, en nie op slypskole, aanbiedings of opleidingsaktiwiteite nie.

“Die raad het oor die jare verskillende metodes ondersoek om met venote betrokke te raak by publikasie en uit die uitgewersaspek te help, maar nie baie maatskappye was bereid om aan boord te kom nie. Die rede hiervoor was dat daar min belangstelling in fiktiewe of kreatiewe skryfwerk in Namibië was en dus is dit as riskant beskou,” het sy gesê.

Sy erken hulle is bewus van die ommin, spesifiek onder digters en skrywers. “Die raad sal in die nabye toekoms hieraan aandag skenk. Ons is tans besig met ’n proses om steun vir literatuurontwikkeling aan te moedig. As die proses afgehandel is, kan ons dit aan die publiek bekend maak. Die raad sal egter nie literêre drukwerk doen soos voorheen terwyl daar nie gehaltebeheer is nie.”

Sy het gesê die hulpfondse bly op vir diene in die literêre bedryf wat daarvoor wil aansoek doen, behalwe in dié stadium vir diene wat hulp met drukwerk of publikasie benodig.

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Mnr. Stefanus Wimerd van die Eiland-gebied moet gereeld water gaan haal om sy tuin nat te lei.

Water nood ry Groot Aub

Jeanette Diergaard

Gedeeltes van Groot Aub was volgens inwoners vir ’n volle twee weke sonder water, terwyl ander dele van die nedersetting vir hoogstens twee dae waterloos was. Die watertekort wat Groot Aub in die gesig gestaar het, het volgens ’n onlangse mediaverklaring net vir agt dae geduur. Die verklaring is deur mnr. Robert Kahimise, die uitvoerende hoof van Windhoek se munisipaliteit (CoW) uitgereik. Watertoevoer aan Groot Aub is op 28 Julie herstel.

Die munisipaliteit se projekoordineerder vir Groot Aub, mnr. James Kalundu, beweer die inwoners se klagtes dat hulle agt dae sonder water was, is ’n oordrywing. Sekere areas was wel sonder water, erken hy, maar nie vir agt dae aanes soos wat die verklaring sê nie. Hy beklemtoon dat wanneer een gebied nie water gehad het nie, sou daar water by ’n ander gebied wees.

Inwoners van die Oshakati-gebied beweer hulle was vir ’n volle twee weke sonder water. Oshakati lê laer as die ander gebiede. Die waterdruk van die hoofwater-reserwetenk is nie sterk genoeg om water aan al die gebiede te verskaf nie en hierbeneuens is daar ook lekkasies aan die tenk. Kalundu sê dit sal goedkoper wees om ’n nuwe reserwetenk te bou as om die tenk te herstel. Een van die twee groot reserwetenks word nie meer gebruik nie, want dit kan nie meer die water suiver nie. Sekere inwoners het ook oor die vuil

water gekla. In die meeste gevalle moet inwoners na die Eiland-gebied ry om hul watertens vol te maak. In vele gevalle het inwoners egter nie vervoer om water te gaan haal nie. Daar is blykbaar ook ’n roteringsstelsel waarop die inwoners water kry, maar van die inwoners weet nie wanneer dit hul beurt is om water te kry nie. Dikwels los hulle ’n kraan op sodat hulle kan weet wanneer die water eindig opdaag. Sedert die koms van die coronavirus betaal geen inwoner van Groot Aub vir munisipale dienste nie. Kalundu sê wanneer die water elke dag vir 24 uur beskikbaar gaan wees, sal inwoners daarvoor moet begin betaal.

BOORGATE

Daar is tans ses werkende boorgate op Groot Aub, plus twee nuwes wat glo binnekort gereed sal wees. CoW het sewe 10 000 liter-watertens, na die nedersetting gebring toe die eerste Covid-19-geval in Namibië uitgebreek het. Die nuwe tenks is strategies geplaas waar daar geen toegang tot die waternetwerk is.

CoW het sedert 2017 Groot Aub van die Khomas-streekraad oorgeneem. Sedertdien is blykbaar vyf boorgate geboor, met twee nuwes wat beplan word.

Eienaars van plase aan die buite-wyke van Groot Aub boor vir hul eie water. Kalundu sê: “Vir te lank het ons negatiewe publisiteit toegelaat. Dit is tyd dat die publiek sien wat ons alles vir Groot Aub doen.” Amptelike dokumentasie is aan Republikein belowe wat uiteensit hoeveel kapitaal in Groot Aub ingegaan het sedert CoW die bestuur daarvan oorgeneem het.

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PUBLIC PARTICIPATION NOTICE ENVIRONMENTAL ASSESSMENT: IRRIGATION AND RELATED ACTIVITIES ON VARIOUS FARMS IN THE OMAHEKE REGION

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Inwoners mag nog om reispermitte aansoek doen

Adolf Kaure op Swakopmund

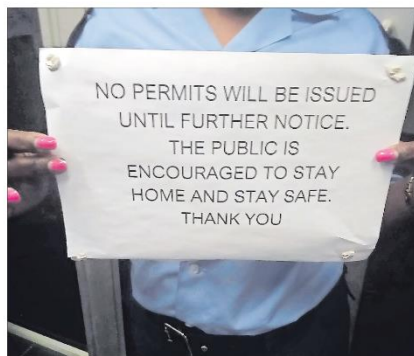
’n Kennisgewing op ’n venster van ’n Swakopmundse polisie-kantoor is Saterdag verwyder nadat dit inwoners verwar het wat om reispermitte wou aansoek doen.

Luidens dié kennisgewing sou geen permitte voortaan uitgereik word nie. “Die publiek word aangemoedig om tuis en veilig te bly, dankie.”

Me. Hannelie Horn Turner, ’n gefrustreerde inwoner, het haar misnoeë in die Facebook-groep “Namibian United against Lock-down” te kenne gegee.

“Dié kennisgewing is vanoggend, 1 Augustus, op die venster van die Swakopmund-polisie-kantoor ten toon gestel. Ek veronderstel dit beteken ons is nou amptelik gevangenes.”

Sy het haar ook tot *Erongo 24/7* se Facebook-blad gewend om te benadruk hoe ongelukkig sy is. Volgens haar het sy omstreeks 09:50 op daardie dag die kennisgewing op die venster aangehef.



Só het die kennisgewing gelui. FOTO ADOLF KAURE

Die kennisgewing is later deur ’n polisiebeampte aan diens verwyder.

Sy het op voorwaarde van anonimiteit gesê die inhoud in die kennisgewing is nie meer geldig

nie en dat inwoners wel om reispermitte aansoek mag doen. “Die kennisgewing is vroeër vanjaar teen die venster geplak en is oud. Dit is nie veronderstel om meer daar te wees nie; so, laat ek dit

nou verwyder.”

Insp. Ileni Shapumbu, gemeel met meenskapsake in die Erongostreek, het by navraag bevestig Swakopmund-inwoners mag aansoek doen om uit die dorp te reis. “Daar bestaan nie so iets ni (reisverbod). Ons reik steeds reispermitte streng volgens wet uit (reisverbod).”

Pres. Hage Geingob het Vrydag by Staatshuis ’n beroep op Namibiërs gedoen om nie onnodig oor reis te gaan nie.

Hy het dié beroep gedoen to hy aangekondig het die Erongostreek bly in fase 3 en die res van die land in fase 4.

Die spesiale bedeling wat vir dié plaaslike owerhede van Walvisbaai, Swakopmund en Arandji gegeld het, is eweneens steed van krag.

Ofskoon die regime Maandag aand om middernag sou verstry het, het Geingob gesê di maaatreëls om die verdere verspreiding van Covid-19 hok te slaan, word opnuut tot middernag op 31 Augustus ingestel.

adolf@erongo.com

Site Notice



Appendix E: Consultants' Curriculum Vitae

ENVIRONMENTAL ASSESSMENT PRACTITIONER**Quzette Bosman**

Quzette Bosman has 14 years' experience in the Impact Assessment Industry, working as an Environmental Assessment Practitioner and Social Assessment practitioner mainly as per the National Environmental Legislation sets for South Africa and Namibia. Larger projects have been completed in terms of World Bank and IFC requirements. She studied Environmental Management at the Rand Afrikaans University (RAU) and University of Johannesburg (UJ), including various Energy Technology Courses. This has fuelled a passion towards the Energy and Mining Industry with various projects being undertaken for these industries. Courses in Sociology has further enabled her to specialize in Social Impact Assessments and Public Participation. Social Assessments are conducted according to international best practise and guidelines. Work has been conducted in South Africa, Swaziland and Namibia.

CURRICULUM VITAE QUZETTE BOSMAN

Name of Firm : Geo Pollution Technologies (Pty) Ltd.
 Name of Staff : QUZETTE BOSMAN
 Profession : Social Impact Assessor /
 Environmental Assessment Practitioner
 Years' Experience : 14
 Nationality : South African
 Position : Senior Environmental Consultant
 Specialisation : ESIA & ESMP; SIA
 Languages : Afrikaans – speaking, reading, writing – excellent
 English – speaking, reading, writing – excellent
 German –speaking - fair



First Aid Class A : EMTSS, 2017
 Basic Fire Fighting : EMTSS, 2017

EDUCATION AND PROFESSIONAL STATUS:

BA Geography & Sociology : Rand Afrikaans University, 2003
 BA (Hons.) Environmental Management : University of Johannesburg, 2004

PROFESSIONAL SOCIETY AFFILIATION:

Namibian Environment and Wildlife Society
 International Association of Impact Assessors South Africa (IAIA SA)
 Member 2007 - 2012
 Mpumalanga branch Treasurer 2008/2009

OTHER AFFILIATIONS

Mkhondo Catchment Management Forum (DWAF): Chairperson 2008-2010
 Mkhondo Water Management Task Team (DWAF): Member 2009

AREAS OF EXPERTISE:

Knowledge and expertise in:

- ◆ environmental impact assessments
- ◆ project management
- ◆ social impact assessment and social management planning
- ◆ community liaison and social monitoring
- ◆ public participation / consultation, social risk management
- ◆ water use licensing
- ◆ environmental auditing and compliance
- ◆ environmental monitoring
- ◆ strategic environmental planning

EMPLOYMENT:

2015 - Present : Geo Pollution Technologies – Senior Environmental Practitioner
 2014-2015 : Enviro Dynamics – Senior Environmental Manager
 2010 - 2012 : GCS – Environmental Manager (Mpumalanga Office Manager)
 2007 - 2009 : KSE-uKhozi - Technical Manager: Environmental
 2006 -2007 : SEF – Environmental Manager
 2004 - 2005 : Ecosat – Environmental Manager

PUBLICATIONS:

Contract reports : +180
 Publications : 1