

**Environmental Scoping Assessment (ESA) Study for:**  
**Proposed Establishment of a Namibian Correctional Service (NCS)**  
**Fully-fledged Facility and Irrigation Activities in Ohongajokatjo, Kaoko-**  
**Otavi Settlement in the Kunene Region**



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**December 2022**

## EXECUTIVE SUMMARY

The Namibian Correctional Service (NCS) (hereinafter referred to as The Proponent) intends to establish and operate a fully-fledged NCS facility and irrigation activities in Ohongajokatjo Village located about 10km east of Kaoko-Otavi Settlement in the Kunene Region (hereinafter referred to as the *Project or Site*).

The activities will be established and carried out on a 250 hectare (Ha) that will include the administration (30ha) and the farming area of 220ha in Ohongajokatjo Village, located about 39km Southwest of Opuwo (between Opuwo and Sesfontein). The centre GPS coordinates of the proposed site: -18.298036° 13.723656°.

Agricultural and associated activities are listed in the EIA Regulation as activities that may not be implemented without an Environmental Clearance Certificate (ECC) under the Environmental Management Act (EMA) (2007) and its 2012 Environmental Impact Assessment (EIA) Regulations. The listed activities as per EIA regulations as relevant to the proposed activity/development are as follows:

*'7. AGRICULTURE AND AQUACULTURE ACTIVITIES AND ASSOCIATED ACTIVITIES*

*8. WATER RESOURCE DEVELOPMENTS*

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

*- 8.7 Irrigation schemes for agriculture excluding domestic irrigation."*

To ensure that the project activities comply with the environmental management laws, the Proponent appointed Excel Dynamic Solutions Pty Ltd (a team of independent Environmental Assessment Practitioners) to undertake the required Environmental Assessment process and apply for the ECC. The Assessment Process produced the Scoping Report and draft Environmental Management Plan (EMP). These documents are submitted to the Environmental Commissioner at the Department of Environmental Affairs and Forestry (DEAF) for evaluation and consideration of the ECC.

## **PROJECT DESCRIPTION**

The project will be undertaken in three phases as listed below and explained under Chapter 2:

- Planning and design phase (the administrative/preparatory works prior to construction),

- Construction and establishment phase (the installation and erection of necessary services infrastructure and structures, respectively), and
- Operational and maintenance phase (the crop growth and production and distribution).

## **PUBLIC CONSULTATION**

### **Public Consultation Activities**

The communication with the stakeholders and interested & affected parties (IAPs) about the project activities was done through the following means and in this order to ensure that the public is notified and afforded an opportunity to comment on the project:

- **Stakeholders / Interested and Affected Parties (IAPs):** The list of stakeholders (IAPs) was developed and updated throughout the environmental assessment process (ESA) process.
- **A Background Information Document (BID)** A non-technical summary of the Project activities (background information document (BID) containing brief information about the project activities was compiled and circulated to IAPs. The email communication containing the BID sent out to the pre-identified IAPs and stakeholders.
- **Environmental Assessment Study notification** were published in *The Namibian* and *New Era* Newspapers dated 07 and 14 October 2022, respectively. The adverts briefly provided information on the project activities, location, inviting the public to register as IAPs and submit their comments/concerns.
- **Project (Public) Notices:** A3 size printed posters were placed in Kaoko-Otavi at the Store and in Opuwo at the Kunene Regional Council.
- **A Consultation Meeting** was scheduled and held on the 01<sup>st</sup> of December 2022. The meeting was scheduled for 10h00 at the DAPEES Hall in Kaoko-Otavi. The meeting was only attended by forty-four (44). The meeting minutes were taken.

The comments and registration request period ran from 07 October to 28 October 2022 with an extension after the consultation meeting to 09 November 2022.

### **Potential Impacts identified**

The proposed irrigation activities are associated with potential impacts that were identified and listed herein. These were described, assessed, and mitigation measures provided accordingly in the EMP.

## **RECOMMENDATIONS AND CONCLUSIONS**

The potential impacts that are anticipated from the project activities were identified, described, and assessed. For the significant adverse (negative) impacts with medium rating, appropriate management and mitigation measures were recommended for implementation by the Proponent.

The interested and affected parties (IAPs) and stakeholders were consulted as per the EMA and its 2012 EIA Regulations (Section 21 to 24). This was done via the two newspapers used for this environmental assessment, i.e., *New Era* and *The Namibian* of 07 and 14 October 2022. A consultation meeting was scheduled, meeting invitations sent to the registered IAPs and stakeholders. The meeting was held in Kaoko-Otavi on the 01<sup>st</sup> of December 2022. Some comments were made and raised on project activities during the consultation meeting.

The potential adverse impacts identified by the Environmental Consultant were found to be of medium rating significance. With the effective implementation the recommended management and mitigation measures, significance of these impacts will be reduced to low rating. To maintain the desirable rating, the implementation of management and mitigation measures, it is highly recommended that the Proponent or the construction Environmental Control Officer (ECO) to conduct the EMP implementation monitoring. Monitoring will not only be done to avoid impacts or maintain their desired rating, but to also ensure that all potential adverse impacts identified in this study and other impacts that might arise during Project implementation are properly and timely identified and addressed accordingly.

The Scoping assessment is deemed sufficient and conclude that no further detailed assessments are required to the ECC application.

Based on the assessment done for the proposed NCS facility and irrigation works (activities) in Kaoko-Otavi, the project and its associated activities do not pose a significant risk to the environment. However, it is highly recommended that the measures provided are effectively implemented and monitoring to protect the environment throughout the project duration.

### **Recommendations**

The Excel Dynamic Solutions (EDS) Consultants are confident that the potential negative impacts associated with the project activities can be managed and mitigated by the effective implementation of the recommended management and mitigation measures. This would also be

improved by more effort and commitment towards monitoring the implementation of these measures.

It is therefore recommended that an Environmental Clearance Certificate be issued for the proposed irrigation activities, subject to the following recommendations that:

- All required permits, licenses and approvals for the proposed activities should be obtained as required.
- The Proponent complies with the legal requirements governing this type of project and its associated activities.
- All mitigations provided in this Report and the management action plans in the draft EMP should be implemented and monitoring conducted as recommended.
- All the necessary environmental and social (occupational health and safety) precautions provided should be adhered to.
- Site areas where construction activities have been completed should be rehabilitated, as far as practicable, to their original state.
- The monitoring of the implementation of mitigation measures should be conducted, applicable impact's actions taken, reporting done and recorded as recommended in the Draft EMP.

Environmental (EMP) Compliance Monitoring should be conducted on a weekly basis during construction by the project Environmental Control Officer or an independent Environmental Consultant and bi-annually during the operational phase. Environmental Compliance monitoring reports should be compiled and submitted to the DEAF.

### **Conclusions**

Based on the assessment conducted for the proposed Site and its planned activities, the project and its associated activities do not pose a significant risk to the environment that would hinder its implementation. However, it is highly recommended that the measures provided are effectively implemented and monitoring to protect the biophysical and social environment throughout the project duration.

### **Disclaimer**

EDS warrants that the findings and conclusion contained herein were accomplished in accordance with the methodologies set forth in the Scope of Work and EMA of 2007 with its 2012 EIA Regulations. These methodologies are described as representing good customary practice

for conducting an EIA for the purpose of identifying recognized environmental conditions. There is a possibility that even with the proper application of these methodologies, there may exist on conditions in the site area that could not be identified within the scope of the assessment, or which were not reasonably identifiable from the available information. The EDS Consultants believe that the information obtained from the record review and during the public consultation processes concerning the project is reliable. However, the Consultants cannot and does not warrant or guarantee that the information provided by the other sources is accurate or complete. The conclusions and findings set forth in this Scoping Report are strictly limited in time and scope to the date of the evaluations. No other warranties are implied or expressed.

Some of the information provided in this Report is based upon personal interviews, stakeholders' engagement and research of available documents, records, and maps held by the appropriate government and private agencies. This Report is subject to the limitations of historical documentation, availability, and accuracy of pertinent records and the personal recollections of the persons contacted or consulted.

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**Appendix B:** Draft Environmental Management Plan (EMP)

**Appendix C:** Curricula Vitae (CV) for the Environmental Assessment Practitioner (EAP)

**Appendix D:** EIA / ESA Notification in the newspapers (*New Era* and *The Namibian*)

**Appendix E:** Consultation Meeting Minutes and signed attendance register

## LIST OF ABBREVIATIONS

Abbreviation	Meaning
BID	Background Information Document
CITES	Convention on International Trade and Endangered Species
CP	Centre Pivot (irrigation technique)
DAPEES	Directorate of Agricultural Extensions and Engineering Services
DEAF	Department of Environmental Affairs and Forestry
DI	Drip Irrigation
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
EDS	Excel Dynamic Solutions
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
ESA	Environmental Scoping Assessment
GG & GN	Government Gazette & Government Notice
IAPs	Interested and Affected Parties
MAWLR	Ministry of Agriculture, Water and Land Reform
MEFT	Ministry of Environment, Forestry and Tourism
NAMPOL	Namibian Police
NCS	Namibian Correctional Service
NORED	Northern Regional Electricity Distributor
PPE	Personal Protective Equipment
Reg / S	Regulation / Section

Abbreviation	Meaning
UN WFP	United Nations World Food Program

## KEY TERMS

Terms	Definition
<b>Alternative</b>	A possible course of action, in place of another that would meet the same purpose and need of the proposal.
<b>Baseline</b>	Work done to collect and interpret information on the condition/trends of the existing environment.
<b>Biophysical</b>	That part of the environment that does not originate with human activities (e.g., biological, physical and chemical processes).
<b>Cumulative Impacts/Effects Assessment</b>	In relation to an activity, means the impact of an activity that in it 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.
<b>Decision-maker</b>	The person(s) entrusted with the responsibility for allocating resources or granting approval to a proposal.
<b>Ecological Processes</b>	Processes which play an essential part in maintaining ecosystem integrity. Four fundamental ecological processes are the cycling of water, the cycling of nutrients, the flow of energy and biological diversity (as an expression of evolution).
<b>Environment</b>	As defined in Environmental Management Act - the complex of natural and anthropogenic factors and elements that are mutually interrelated and affect the ecological equilibrium and the quality of life, including – (a) the natural environment that is land, water, and air; all organic and inorganic matter and living organisms and (b) the human environment that is the landscape and natural, cultural, historical, aesthetic, economic and social heritage and values.
<b>Environmental Management Plan</b>	As defined in the EIA Regulations (Section 8(j)), a plan that describes how activities that may have significant environments effects are to be mitigated, controlled, and monitored.

Terms	Definition
<b>Interested and Affected Party (IAP)</b>	In relation to the assessment of a listed activity includes - (a) any person, group of persons or organization interested in or affected by an activity; and (b) any organ of state that may have jurisdiction over any aspect of the activity. Mitigate - practical measures to reduce adverse impacts. Proponent – as defined in the Environmental Management Act, a person who proposes to undertake a listed activity. Significant 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.
<b>Fauna and Flora</b>	All the animals and plants found in an area.
<b>Mitigation</b>	The purposeful implementation of decisions or activities that are designed to reduce the undesirable impacts of a proposed action on the affected environment.
<b>Monitoring</b>	Activity involving repeated observation, according to a pre-determined schedule, of one or more elements of the environment to detect their characteristics (status and trends).
<b>Proponent</b>	Organization (private or public sector) or individual intending to implement a development proposal.
<b>Public Consultation/Involvement</b>	A range of techniques that can be used to inform, consult or interact with stakeholders affected by the proposed activities.
<b>Protected Area</b>	Refers to a protected area that is proclaimed in the Government Gazette according to the Nature Conservation Ordinance number 4 of 1975, as amended.
<b>Scoping</b>	An early and open activity to identify the impacts that are most likely to be significant and require specialized investigation during the EIA work. Can, also be used to identify alternative project designs/sites to be assessed, obtain local knowledge of site and surroundings, and prepare a plan for public involvement. The results of scoping are frequently used to prepare a Terms of Reference for the specialized input into full EIA.
<b>Terms of Reference (ToR)</b>	Written requirements governing full EIA input and implementation, consultations to be held, data to be produced and form/contents of the EIA report. Often produced as an output from scoping.

## 1 INTRODUCTION

Irrigation is mostly practiced in arid to semi-arid zones, here referred to as dry lands, but is also known from humid areas. Dry lands are poor in precipitation and suffer tremendous climate variability from year to year, thus increasing the vulnerability of cultivated ecosystems.

There are two main ways that farmers and ranchers use agricultural water to cultivate crops: rain-fed farming and irrigation. Rain-fed farming is the natural application of water to the soil through direct rainfall. Relying on rainfall is less likely to result in contamination of food products but is open to water shortages when rainfall is reduced. On the other hand, artificial applications of water increase the risk of contamination (Excel Dynamic Solutions, 2021).

Irrigation is the artificial application of water to the soil through various systems of tubes, pumps, and sprays. Irrigation is usually used in areas where rainfall is irregular or dry times or drought is expected. There are many types of irrigation systems, in which water is supplied to the entire field uniformly. Irrigation water can come from groundwater, through springs or wells, surface water, through rivers, lakes, or reservoirs, or even other sources, such as treated wastewater or desalinated water.

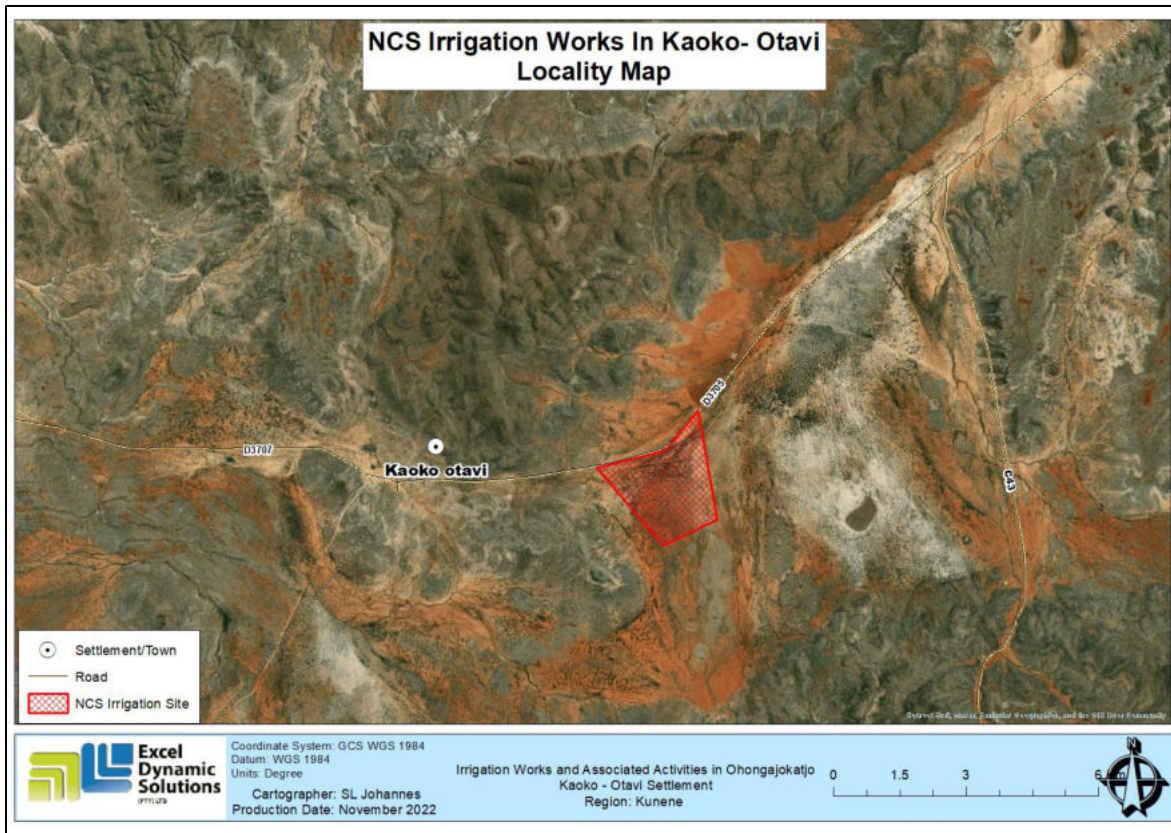
The aspect of carrying out irrigation activities with a reliance on surface water supply is common in arid counties such as Namibia. The typical water supply sources for both small, medium, and large-scale irrigation projects are shared perennial rivers on the borders of Namibia with other neighboring countries. These perennial rivers are the Orange, Kunene, Kavango and Zambezi Rivers. However, the use of these perennial river water would only be ideal and economical feasible for projects located within proximity of these rivers. Therefore, the proposal to carry out irrigation project inland (far from perennial rivers) would be dependent on either groundwater and heavily on harvested rainwater stored in artificial-made dams and or reservoirs that would also rely on good rains to fill up these dams.

Most commercial farm owners in the country beside owning land, have identified the gap in the agricultural market to provide different services and goods that can be produced from their lands. The main product that can be produced from these farms include livestock as well as crops. Since water is the major driving force of economies globally, it is therefore a main challenge that hinder the implementation of such plans and achieve the dreams of successfully utilizing the land.

### 1.1 Project Background and Locality

The Namibian Correctional Service (NCS) (hereinafter referred to as The Proponent) intends to establish and operate a fully-fledged NCS facility and irrigation activities in Ohongajokatjo Village located about 10km east of Kaoko-Otavi Settlement (Figure 1-1) in the Kunene Region (hereinafter referred to as the *Project or Site*).

The activities will be established and carried out on a 250 hectare (ha) that will include the NCS facility and related operational buildings (30ha) and the farming area of 220ha in Ohongajokatjo Village, located about 39km Southwest of Opuwo (between Opuwo and Sesfontein). The centre GPS coordinates of the proposed site: -18.298036° 13.723656°. Since the Project will be undertaken on a communal land, a Land Use Consent has been granted by the Vita Royal House Traditional Authority (Appendix A).



**Figure 1-1: Locality of the proposed NCS Facility and Irrigation Activities Site near Kaoko-Otavi in the Kunene Region**

## 1.2 The Need for the Environmental Scoping Assessment

Agricultural and associated activities are listed in the EIA Regulation as activities that may not be implemented without an Environmental Clearance Certificate (ECC) under the Environmental Management Act (EMA) (2007) and its 2012 Environmental Impact Assessment (EIA) Regulations. The listed activities as per EIA regulations as relevant to the proposed activity/development are as follows:

*'7. AGRICULTURE AND AQUACULTURE ACTIVITIES AND ASSOCIATED ACTIVITIES*

*8. WATER RESOURCE DEVELOPMENTS*

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

*- 8.7 Irrigation schemes for agriculture excluding domestic irrigation."*

To ensure that the project activities comply with the environmental management laws, the Proponent appointed Excel Dynamic Solutions Pty Ltd (a team of independent Environmental Assessment Practitioners) to undertake the required ESA process and apply for the ECC. This process includes public & stakeholders' engagement and consultation, compilation of the ESA Report and draft Environmental Management Plan (EMP). These documents will then be submitted to the Environmental Commissioner at the Department of Environmental Affairs and Forestry (DEAF) for evaluation and consideration of the ECC.

The application for the ECC was compiled and submitted to the Environmental Custodian, the Ministry of Environment, Forestry and Tourism (MEFT)'s Department of Environmental Affairs and Forestry (DEAF) for consideration of the ECC by the Environmental Commissioner at MEFT. The ECC would be considered upon submission of an Environmental Scoping Assessment (ESA) or Scoping Report and Draft Environmental Management Plan (EMP) – Appendix B.

## 1.3 Appointed Environmental Assessment Practitioner

To satisfy the requirements of the EMA and its 2012 EIA Regulations, NCS (Proponent) appointed a team of independent environmental consultants (Excel Dynamic Solutions (Pty) Ltd (EDS)), to conduct the required Environmental Assessment (EA) process.

The Scoping Assessment Study was conducted, and reporting done by Ms. Fredrika Shagama, an experienced EAP and qualified Geohydrologist with over 7 years of experience in the



Environmental and Groundwater Management Consulting sector. Ms. Shagama' Curriculum Vitae (CV) is presented under Appendix C.

#### **1.4 The Need for the Irrigation Activities in Kaoko-Otavi**

The NCS is mandated to provide safe, secure, and humane custody of offenders, rehabilitate and re-integrate them into community. The NCS Mission is to provide exceptional correctional service that empower offenders to effectively re-integrated into society as law abiding citizen.

Furthermore, the operations of all NCS facilities follow the United Nations (UN) Standard Minimum Rules for the treatment of prisoners. These dictates that every prisoner shall be provided by the administration at the usual hours with food of nutritional value adequate for health and strength, of wholesome quality and well prepared and served. Hence, the NCS is currently managing six (6) production farms including the Evaristus Shikongo Correctional Facility near Tsumeb that produces maize, wheat, vegetables, beef, and pork for offenders' rations. These production farms are aimed at improving organizational self-sufficiency and reduce government expenditures in the procurement of offenders' rations. There is also a proposed Piggery and Abattoir for the NCS' Evaristus Shikongo facility which will also help to reduce the idleness amongst offenders.

The NCS is also committed to be self-reliant in terms of improved food and nutrition security of offenders through sustainable climate smart food production by establishing self-managed projects such as irrigation, piggery, abattoirs, etc. This practice does not only help the NCS, but the whole government by reducing the national budget allocated to food for the prisoners.

The construction and eventual operation of the Irrigation Project in the Kaoko-Otavi area will create further job opportunities for the local communities, by employing people from Kaoko-Otavi, Opuwo Rural Constituency and surrounding areas, as well as food distribution to NAMPOL stations in Kunene, Omusati, Ohangwena and Oshana Regions local school feeding programs. Furthermore, the construction, operational and maintenance phases would also create opportunities to services providers particularly for specialized services that NCS will not have capacity on. This in return will also contribute to the socio-economic development of the Opuwo Rural Constituency and Kunene Region at large.

The description of the proposed project activities is provided under Chapter 2.

## 2 THE DESCRIPTION OF PROJECT ACTIVITIES

### 2.1 Planning and Design Phase

The planning and design phase which also include the EIA is aimed at presenting some key concepts of the project alongside a general overview of the study area, the legal landscape to be considered, and a preliminary assessment of the main aspects that might affect the feasibility of the project and or its associated activities. Thereafter, the environmental, technical, and financial aspects of the project is assessed by identifying potential risks and proposing mitigation measures where possible. This would also include highlighting ‘fatal flaws’ wherever mitigation measures are unavailable or impractical with regards to the available finances and other resources.

Prior to commencement of any site work, all personnel (including fully employed, contracted, and casual) will be inducted on the Proponent’s Environmental, Health and Safety Policy as well as procedures and processes to follow while conducting the work on site or offsite work related to the Project.

Consultations, particularly with competent and relevant government stakeholders will be done to notify them of the commencement of project groundwork.

Upon approval of the EIA Study (and issuance of the ECC), and completion of all necessary planning and design (administrative/preparatory) works, construction activities of Site will commence. Construction works will be outsourced to a contractor (to be appointed on tender).

It should be noted that the preliminary design layouts or drawings of the Site are not yet available, however, they will be prepared during this phase prior to establishment.

### 2.2 Site Clearing (De-Bushing) and Construction Phase

This will entail site clearing of some of the shrubs on the project site, and earth levelling in preparation of the installation of above-mentioned services infrastructure and erection of the NCS facility and supporting structures.

The construction work will also include the installation of irrigation systems and associated infrastructure on the demarcated areas at the Site. Furthermore, in preparation for the operational phase, the construction works will also entail the establishment of the water pipeline system and its connection to the water source (Site boreholes) and project Site pumps.

The following works will be done in terms of infrastructure and services provision:

- Construction of NCS facility buildings, related facility operation buildings and services infrastructures such as stormwater management channels, access roads, offloading zones, etc.
- Installation of; power supply cables, potable water pipelines, sewage systems and wastewater disposal pipelines.

### **2.2.1 Project Input and Resources Requirements**

In terms of inputs and resources to undertake the proposed irrigation activities, the following will be required:

- Vehicles (trucks, 4x4 bakkies, etc.), equipment and machinery, temporary structure facilities such as camping, offices and or administration rooms as well as ablution.
- Hoses, centre pivots, pipes, irrigation controllers, sprinkler heads, pumps, nets, and poles.
- Storage facilities for project equipment and materials as well as containers (water, fuel, and other supplies).
- For the construction of the Site, construction materials will be sourced from the local building materials suppliers in Opuwo. And if necessary, and as required, materials will be sourced from elsewhere in the country or outside the country and as per the required and approved material standards.

### **2.3 Post-Construction Site Rehabilitation**

Once construction phase has been completed, the associated works will be ceased, and site cleaned up in preparation for the next phase (operations). The activities to be carried out to clean up and rehabilitate the site post-construction are as follows:

- Dismantling and removal of all infrastructures and structures that will no longer be required for the operational and maintenance phase. These structures include camping sites, storage tanks, onsite temporary construction offices and ablution facilities and other supporting structures erected for construction. These will be transported to designated storage facilities offsite.
- Removal of all construction related vehicles, machinery, and equipment from site to designated parking and storage sites off site, respectively.

- Carrying away the waste storage containers and disposal of waste to nearest designated and approved waste management site (in Opuwo).
- Closure of all onsite access roads that may have been created for the construction phase and no longer required for operational phase.
- Levelling of stockpiled topsoil and where possible, backfilling of all construction excavated pits and trenches.

## 2.4 Operational and Maintenance Phase

It is within this phase that the irrigation and associated activities will be undertaken, and maintenance of the irrigation fields and equipment done by the Proponent (and or their appointed maintenance contractors).

The proposed project will be implemented by NCS in close collaboration with the local UN's WFP, while maintenance of the Site will be done by the NCS.

For the operational phase, the Site will have the equipment and machinery listed below.

- Seven (7) 30 ha center pivots
- A sprinkler irrigation system for 10 ha
- One (1) Combine harvester with maize and wheat head.
- Four (4) tractors
- Two (2) maize planters
- Two (2) wheat planter
- Two (2) mould board ploughs
- Two (2) disc ploughs
- Two (2) rippers
- One (1) self-propelled boom sprayer
- One (1) Hammer mill with a pre-cleaner
- One (1) 1400-ton Silo
- One (1) Cool-room for vegetable
- Two (2) warehouse grain storages
- Two (2) storerooms for inputs and farming implements
- Security perimeter fence
- One (1) diesel tank (23,000-liter volume)
- One (1) 30-ton loading truck
- Houses for NCS officers
- Offenders' accommodations
- NCS Administration building and other facility operations related buildings
- One (1) vegetable planter
- Two (2) seedbed preparators
- Four (4) 10-ton trailers

### 2.4.1 The Irrigation Method and Process

The agricultural / irrigation Project is expected to have seven (7) center pivots (to be determined once the total area is known) each measuring thirty (30) hectares. These center pivots will be used to produce crops such as maize, and wheat. Most of the maize, wheat and vegetables produced will be supplied to Namibian Correctional Service facilities, Namibian Police and to the community schools feeding program.

The description of the centre pivot irrigation method is presented below as per Phocaides (2007).

#### **Centre Pivot (Sprinkler) Irrigation description according to Phocaides (2007)**

The Centre Pivot (CP) system consists of one single sprayer or sprinkler pipeline of relatively large diameter, composed of high tensile galvanized light steel or aluminum pipes supported above ground by towers move on wheels, long spans, steel trusses and/or cables (Figure 2-1). One end of the line is connected to a pivot mechanism at the center of the command area; the entire line rotates about the pivot. The application rate of the water emitters varies from lower values near the pivot to higher ones towards the outer end using small and large nozzles along the line accordingly.

Like the Drip system, a typical sprinkler irrigation system consists of the following components:

- Pump unit
- Mainline and sometimes submains,
- Laterals, and
- Sprinklers.



**Figure 2-1: The Centre Pivot (Sprinkler) system (Phocaides, 2007)**

The Center Pivot is a low/medium pressure fully mechanized automated irrigation system of permanent assemble. It is used for supplementary irrigation for rain fed grain. The cost of each system unit is relatively high and is therefore best suited to large, irrigated farms. The area covered can be from 3.5ha to 60ha, according to the size of the CP, and the larger the area the lower is the cost of the system per unit area. The typical center pivot system consists of a single long irrigating pipeline attached to a central tower and moves slowly over the field in a circular pattern and irrigates the plants with sprayers, or sprinklers placed on it at frequent spacing. The central tower with a pivot mechanism and main control panel (electric) is anchored to a small concrete base at a fixed water supply point (hydrant) at the center of the field. The entire irrigating pipeline is supported above ground by “A” frame towers move on wheels, long spans, steel trusses and/or cables; the end of the pipe is overhung with a sprinkler gun. The whole system rotates slowly, at a typical speed (last span) of 2–3 meters per minute (m/min), around the fixed pivot, self-propelled, applying water in the form of overhead spray irrigation and covers the area in a circular pattern. The drive system features small individual power units mounted on each wheeled tower. These units are electric drive, but can be hydraulic (water, oil) or mechanical drive. An automatic alignment system always keeps the irrigating pipeline straight (Figure 2-2).



**Figure 2-2: The Centre Pivot system overview (Phocaides, 2007)**

The crops that will be grown at the Project site as part of the proposed activities are as follows.

#### **2.4.1.1 Maize Production**

Each year, the total area that will be planted with maize during summer is 210ha, however, winter maize planting will also be considered to maximize production. The expected yield of maize is eight tons (8 tons/ha) per hectares and the total output will be (1680 tons x N\$7.50 x 1000kg) twelve million and six hundred thousand (N\$12,600,000.00) per summer. However, the price of maize grain is expected to increase with N\$1.00 per ton every year as a measure to mitigate the inflation rate.

#### **2.4.1.2 Wheat production**

Similarly, two hundred hectares (200ha) hectares will be planted with wheat during winter and the expected yield per hector is six (6 tons/ha) tons per hectares. Thus, six million and three hundred thousand (N\$6,300,000.00) will be realized i.e. (1260 tons x N\$5.00 x 1000 kg). The price for wheat grain is also expected to increase by N\$1.00 per ton every year as a measure to mitigate the inflation rate.

#### **2.4.1.3 Vegetable production**

Ten (10) hectares will be used for vegetable production that will be supplied to NCS facilities, NAMPOL stations in Kunene, Omusati, Ohangwena and Oshana Regions as well as the school feeding program. Every month, two point five (2.5ha) will be planted with vegetables and the

estimated yield per hectare is ten (10 tons) tons which translates into N\$250,000.00 per month (2.5ha x N\$10.00 x 10,000kg).

## **2.5 Human Resources, Services, and infrastructure**

The following services and infrastructure as provided below will be required for the Project activities:

### **2.5.1 Human Resources (Workforce)**

Temporary employment opportunities will be created during the construction phase. However, the exact number of people to be employed by the appointed contractor cannot be determined at this stage. Therefore, the number will be determined by the contractor based on project needs. Similarly, for the operational phase, some people will be employed onsite to help NCS with the operations of the Project.

### **2.5.2 Accommodation**

During construction, the very skilled that may be from outside Kaoko-Otavi and Opuwo/Sesfontein and general workers who are live over 2km from Site are expected to be housed in tented camps onsite (when necessary) or commuting from Opuwo. Construction workers from surrounding areas will be commuting from and to their homes daily. This is to avoid having too many workers living on site for the duration of the construction phase.

During operations, permanent accommodation facilities (for offenders working onsite and Project staff) will be constructed onsite.

### **2.5.3 Water supply**

Water for the Project and related activities will be sourced from the existing water supply of five (5) boreholes onsite. The quantity of water consumption is not yet known.

Commonly there are two employed irrigation methods/techniques, namely the Centre Pivot (opted for the Project) and Drip irrigation. The two irrigation techniques have different water requirement per hectare of irrigated land, therefore, the two have been weighed and assessed in the environmental assessment report (under the alternatives chapter) to select the best option or combined, from both economic, technical, and environmental perspectives.



### **2.5.4 Power and Fuel Supply (machinery and equipment)**

During construction, diesel generators will be used to provide power to machinery and equipment. For the operations, the Site will be connected to the power grid that pass by the Site (connecting Kaoko-Otavi to Opuwo. The power supply agreements will be entered to by NCS and NORED (the regional electricity distributor). As a backup, the Project will be equipped with generators to be kept on standby onsite.

### **2.5.5 Solid waste and Sewage management**

Solid waste will be stored on-site in designated waste bins and transported to the municipal site in Opuwo Town, as often as necessary.

Sewage management: the construction workers will be using portable toilets throughout this phase. These toilets will be provided by the appointed construction contractor. For the operational phase, septic tank and sewer pond connected toilets will be erected and installed onsite.

### **2.5.6 Hazardous waste**

The hazardous substance such as oil/fuels and grease as well as used oils will be carefully handled and stored in a standardized container for disposal at the nearest approved hazardous waste management facility in the country.

### **2.5.7 Site Access**

The site is accessible from the C43 via D3705 by the existing single-track sandy/gravel access roads that will be utilized by project related vehicles.

### **2.5.8 Site Safety and Security**

The construction contractor will construct a temporary fence wall or corrugated iron sheets around the construction site to control access to the site. For operations, a security perimeter fence will be constructed around the site.

It is expected that there will be construction vehicles and equipment on site during this phase. It is for this reason that 24-hour onsite security personnel will need to be appointed to guard the equipment against possible equipment vandalism and theft and community safety.

### **2.5.9 Health and Safety**

To ensure health and safety onsite throughout Project implementation (from construction throughout to operational and maintenance), the Project personnel will be provided with appropriate Personal Protective Equipment (PPE). A fully furnished first aid kit will be provided onsite, whereby 2 to 3 workers trained on how to administer first aid.

### **2.5.10 Potential Accidental Fire Outbreaks**

A minimum of two fire extinguishers will be readily available onsite during construction. During the operational phase, each building will be equipped with a well-serviced fire extinguisher.

Due to the magnitude and type of facility (Project) and related infrastructure, fire hydrants and fire reel hose will be availed onsite. A fully-fledged facility such as this needs to have these services on the ground (in place), because structures such as silo and other grain, seeds, fertilizers, and weeds controlling chemicals storage facilities are flammable (high fire risk factors).

### **2.5.11 Crop Production Care and Water Use and Management**

The operational works will entail the following in terms of crop growth and production:

- Weed and nutrients (fertilizer application) control, and
- Insect, and pest management as well as diseases control.

Furthermore, operations will also include some actions for water use and management:

- Pumping water from the boreholes to irrigation site areas as required,
- Frequent measuring and recording of water volumes to monitor water use and for management purposes, and
- Monitoring of onsite water storage reservoir to ensure safety and manage possible water leakages.

### **2.5.12 Harvesting and Processing of Crops**

Once the planting and growth period is over, the crops will then be carefully harvested into onsite containers, packaged and or processed for the destinations at the NCS facilities, NAMPOL stations in the target regions and supply to the local school feeding programs.

## 2.6 Decommissioning of Project Activities

Due to the nature of irrigation projects, where the project life span is based on the reliability of resources, such as water from the source, the life span of an irrigation project of this nature would be generally more than 50 years as food would always be needed. Given the fact that there would always be a need for food to feed the offenders at the NCS facilities in the country, a complete decommissioning of the project activities is not anticipated at this stage.

### 3 PROJECT ALTERNATIVES

Alternatives are defined as the “*different means of meeting the general purpose and requirements of the activity*” (EMA, 2007). This section will highlight the different ways in which the project can be undertaken and to identify the alternative that will be the most practical, but least damaging to the environment is identified.

Once the alternatives have been established, these are examined by asking the following three questions:

- What alternatives are technically and economically feasible?
- What are the environmental effects associated with the feasible alternatives?
- What is the rationale for selecting the preferred alternative?

The alternatives considered for the project are discussed in the following subsections.

#### 3.1 Types of Alternatives Considered

##### 3.1.1 The "No-go" Alternative

The “No-go” alternative is the option of not proceeding with the activity, which typically implies a continuation of the status quo. In this case, this would mean, no abstraction of water from the Site boreholes to carry out irrigation works onsite and associated benefits.

Should the proposed project not be allowed to go ahead, the need to be self-reliant on food production for the NCS will not be fulfilled and the bare minimum food supply to the NCS facilities, NAMPOL stations in the Kunene, Omusati, Ohangwena and Oshana Regions as well as local school feeding programs in the area remains the same. Added to this, the planned employment of the Kaoko-Otavi area communities will not be realized, leading to underutilization of the land in the area and poor socio-economic development in the area.

The “no action” alternative simply implies that the status quo remains, and nothing happens. Discontinuing the irrigation proposal would mean that none of the potential impacts (positive and negative) identified would occur. The current land use for the proposed site would also remain unchanged.

Considering the above losses, the “no-action/go” alternative was not considered a viable option.

### 3.1.2 Irrigation Method: Suitability

Testing of the various methods (systems) under the prevailing local conditions provides the best basis for a sound choice of irrigation method (Green Team Consultants, 2019 cited Brouwer, et al, (2001). There commonly used irrigation methods are surface, sprinkler or drip, basin, furrow, or border. The suitability of these methods depends mainly on the following factors:

- **Natural conditions:** *These include soil type, slope, climate, and water availability.*
- **Type of crop:** *Surface irrigation can be used for all types of crops. Sprinkler and drip irrigation, because of their high capital investment per hectare, are mostly used for high value cash crops, such as vegetables and fruit trees. They are seldom used for the lower value staple crops. Drip irrigation is suited to irrigating individual plants or trees or row crops such as vegetables and sugarcane. It is not suitable for close growing crops (e.g., rice).*
- **Type of technology:** *The type of technology affects the choice of irrigation method. In general, drip and sprinkler irrigation are technically more complicated methods. The purchase of equipment requires high capital investment per hectare. To maintain the equipment a high level of 'know-how' must be available. Also, a regular supply of fuel and spare parts must be maintained which, together with the purchase of equipment. Surface irrigation systems - in particular, small-scale schemes usually require less sophisticated equipment for both construction and maintenance (unless pumps are used).*
- **Previous experience with irrigation:** *The choice of an irrigation method also depends on the irrigation tradition within the region or country. Introducing a previously unknown method may lead to unexpected complications,*
- **Required labour inputs:** *Surface irrigation often requires a much higher labor input - for construction, operation, and maintenance - than sprinkler or drip irrigation. Surface irrigation requires accurate land levelling, regular maintenance, and a high level of farmers' organization to operate the system. Sprinkler and drip irrigation require little land levelling; system operation and maintenance are less labor-intensive.*
- **Costs and benefits:** *Before choosing an irrigation method, an estimate must be made of the costs and benefits of the available options. On the cost side not only the construction and installation, but also the operation and maintenance (per hectare) should be considered. These costs should then be compared with the expected benefits (yields).*

### 3.1.3 Irrigation Method: Technology

The different irrigation methods are listed and briefly described below according to Centre for Disease Control and Prevention (2016) and Brouwer, *et al* (1985):

- **Surface:** *Water is distributed over and across land by gravity, no mechanical pump involved.*
- **Centre pivot irrigation also known as Sprinkler irrigation:** *this method is like natural rainfall. Water is pumped through a pipe system and then sprayed onto the crops through rotating sprinkler heads. In other words, water is distributed by a system of sprinklers that move on wheeled towers in a circular pattern. This system is common in flat areas of the United States.*
- **Drip (sometimes referred to as trickle irrigation):** *With drip irrigation, water is conveyed under pressure through a pipe system to the fields, where it drips slowly onto the soil through emitters or drippers which are located close to the plants. Only the immediate root zone of each plant is wetted. Therefore, this can be a very efficient method of irrigation.*
- **Lateral move irrigation:** *Water is distributed through a series of pipes, each with a wheel and a set of sprinklers, which are rotated either by hand or with a purpose-built mechanism. The sprinklers move a certain distance across the field and then need to have the water hose reconnected for the next distance. This system tends to be less expensive but requires more labor than others.*
- **Sub-irrigation:** *Water is distributed across land by raising the water table, through a system of pumping stations, canals, gates, and ditches. This type of irrigation is most effective in areas with high water tables.*
- **Manual irrigation:** *Water is distributed across land through manual labor and watering cans. This system is very labor intensive.*

### 3.1.4 Alternative Activity and Location

This type of alternative is weighed in terms of what other development could have been considered for the Site. The Proponent did not consider any other alternative land use for the site in the Region. This could be because the site is vacant and under-utilized. The Site was also selected to not only produce food for the NCS facilities, NAMPOL stations in the Kunene and other northern neighboring regions but also to help with the provision of food to local schools in this part of the Kunene Region. Besides, the Site is within an area with similar land use type

(agricultural/farming activities). It is for this reason; that the NCS facility and associated irrigation works would be the viable project on the Site.

### 3.1.5 Services Infrastructure

The project site is suitable given its proximity to the following services infrastructure:

- Site accessibility: the proposed site is easily accessible from the D3705 road.
- Water supply: there are existing boreholes onsite and the Site is within porous aquifers to supply the water (refer to the Water resources baseline).
- Power supply: The Site is located within proximity of the NORED and for connection to the local grid.

### 3.1.6 Preferred for or Justification of the Irrigation Method

The Proponent has presented the typical irrigation methods that are considered for the irrigation activities, namely the Centre Pivot and Drip irrigation systems.

The two commonly used irrigation methods are described and compared in Table 3-1 to select the ideal and or a combination of both based on their techniques, and economic, technological as well as environmental aspects.

Table 3-1: Comparisons of the Centre Pivot and Drip Irrigation common systems

	Irrigation Method		Preferred option or Justification
	Centre Pivot (Sprinkler)	Drip	
Water requirement per hectare of irrigated land	According to figures provided by a Planning Engineer on a different project, Centre Pivot irrigation technique would on 1 ha require an average of 20,270 m <sup>3</sup> per annum (totalling to an average of 6,081,000 m <sup>3</sup> to irrigate 300 ha of land) (Excel Dynamic Solutions, 2021).	According to preliminary figures provided for a different irrigation project, drip irrigation technique would on 1 ha requires an average of 16,470 m <sup>3</sup> per annum totalling to about 4,941,000 m <sup>3</sup> per annum to irrigate the 300 ha of land (Excel Dynamic Solutions, 2021).	According to the preliminary water requirement estimate, water demand (saving) wise, the Drip irrigation would be the best technique for the project compared to Centre Pivot technique which would require 1,140,000 m <sup>3</sup> less annually.
<b>Comparisons according to Brouwer <i>et al.</i>, (1985)</b>			
Suitable crops	Sprinkler or Centre Pivot irrigation is suited for most row, field and tree crops and water can be sprayed over or under the crop canopy. However, large sprinklers are not recommended for irrigation of delicate crops such as lettuce because the large water drops produced by the sprinklers may damage the crop.	Drip irrigation is most suitable for row crops (vegetables, soft fruit), tree and vine crops where one or more emitters can be provided for each crop.	Drip irrigation would be costly with no guarantee of return on investment. However, combined with Centre Pivot, this could work for best production.
Suitable slopes	Sprinkler irrigation is adaptable to any farmable slope, whether uniform or undulating. The lateral pipes supplying water to the sprinklers should always be laid out along the land contour whenever possible. This will minimize the pressure changes at	Drip irrigation is adaptable to any farmable slope. Normally the crop would be planted along contour lines and the water supply pipes (laterals) would be laid along the contour also. This is done to minimize changes in emitter discharge because of land elevation changes.	The project site is relatively flat, and both these irrigation techniques would be ideal for the project in this aspect.



	Irrigation Method		Preferred option or Justification
	Centre Pivot (Sprinkler)	Drip	
	the sprinklers and provide a uniform irrigation.		
Suitable soils	<p>Sprinklers are best suited to sandy soils with high infiltration rates although they are adaptable to most soils. The average application rate from the sprinklers (in mm/hour) is always chosen to be less than the basic infiltration rate of the soil so that surface ponding and runoff can be avoided.</p> <p>Sprinklers are not suitable for soils which easily form a crust. If sprinkler irrigation is the only method available, then light fine sprays should be used. The larger sprinklers producing larger water droplets are to be avoided.</p>	Drip irrigation is suitable for most soils. On clay soils water must be applied slowly to avoid surface water ponding and runoff. On sandy soils higher emitter discharge rates will be needed to ensure adequate lateral wetting of the soil.	The project site soils are loamy sandy, and both these irrigation techniques would be ideal for the project in this regard.
Suitable irrigation water	A good clean supply of water, free of suspended sediments, is required to avoid problems of sprinkler nozzle blockage and spoiling the crop by coating it with sediment.	<p>One of the main problems with drip irrigation is blockage of the emitters. All emitters have very small waterways ranging from 0.2-2.0 mm in diameter and these can become blocked if the water is not clean. Thus, it is essential for irrigation water to be free of sediments. If this is not so, then filtration of the irrigation water will be needed.</p> <p>Blockage may also occur if the water contains algae, fertilizer deposits and dissolved chemicals which precipitate such as calcium and iron. Filtration may</p>	The intended water will be supplied from the Site boreholes that are said to be of good quality (clean water) and enough to cater for the irrigation through either techniques' systems. Therefore, either of the two methods / techniques can

	Irrigation Method		Preferred option or Justification
	Centre Pivot (Sprinkler)	Drip	
		remove some of the materials, but the problem may be complex to solve and requires an experienced engineer or consultation with the equipment dealer.  Drip irrigation is particularly suitable for water of poor quality (saline water). Dripping water to individual plants also means that the method can be very efficient in water use. For this reason, it is most suitable when water is scarce.	use the planned water supply.  Drip irrigation would also be ideal even if the water quality is not always the best and, in an area, where water supply is already scarce, it can be utilized.

According to the comparisons of the two common irrigation methods/techniques in the Table above, the two methods have more common aspects in terms of technology requirements. The only major difference is in the water demand, with the Drip irrigation system being more water conserving compared to Centre Pivot. However, this water issue would only be a problem during times of drought and poor rainfall, when the Site boreholes are not well-recharged or over-pumped to sustainably cater for the project’s water needs through the Centre Pivot system solely. Drip irrigation is further also considered as the most suitable when water is scarce (Brouwer *et al.*, 1985). Although the two methods may have some disadvantages associated with their applications, they have been widely applied and their advantages surpass that of other methods listed above. Therefore, with that said, a combination of the Centre Pivot and Drip would be best preferred approach to grow and produce crops onsite for the NCS.

The above provided Project description, associated activities and considered alternatives thereto are governed by specific legal framework, from a local, regional, and national perspective. The presentation of these legal requirements is provided under Chapter 4.

## 4 LEGAL FRAMEWORK: LEGISLATION, POLICIES AND GUIDELINES

A review of applicable and relevant Namibian legislation, policies, and guidelines to the project is given in this section. This review serves to inform the project Proponent, Interested and Affected Parties, and the decision-makers at the DEAF of the requirements and expectations, as laid out in terms of these instruments, to be fulfilled for the implementation of the Project.

### 4.1 The Environmental Management Act No. 7 of 2007 and 2012 EIA Regulations

The Environmental Management Act No.7 of 2007 and its 2012 EIA Regulations aims to ensure that the potential impacts of the project on the environment are considered carefully and in good time; that all interested and affected parties have a chance to participate in the environmental assessments and that the findings of the environmental assessments are fully considered before any decisions are made about activities which might affect the environment.

The Act aims at promoting sustainable management of the environment and use of natural resources. The Environmental Management Act (EMA) is broad; it regulates land use development through environmental clearance certification and/or Environmental Impact Assessments. The listed activities in the Regulations that are relevant to the project and its associated activities are as follows:

#### *“7. AGRICULTURE AND AQUACULTURE ACTIVITIES*

##### *ASSOCIATED ACTIVITIES*

#### *8. WATER RESOURCE DEVELOPMENTS*

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

*- 8.7 Irrigation schemes for agriculture excluding domestic irrigation.”*

**Implication and applicability for the project:** The Proponent should carry out an assessment of the impact on the receiving environment and obtain an ECC for the proposed activities.

## 4.2 Other Legal Requirements (Legislation, Acts, Policies, etc.)

The legal obligations that are relevant to the project activities are presented in Table 4-1.

**Table 4-1: Applicable local, and national acts, policies and guidelines governing the project**

Legislation / Policy / Guideline: Custodian	Relevant Provisions	Implications for this project
<p>The Constitution of the Republic of Namibia, 1990 as amended:</p> <p><b>Government of the Republic of Namibia</b></p>	<p>The Constitution of the Republic of Namibia (1990 as amended) addresses matters relating to environmental protection and sustainable development. Article 91(c) defines the functions of the Ombudsman to include:</p> <p>“...the duty to investigate complaints concerning the over-utilisation of living natural resources, the irrational exploitation of non-renewable resources, the degradation and destruction of ecosystems and failure to protect the beauty and character of Namibia...”</p> <p>Article 95(l) commits the state to actively promoting and maintaining the welfare of the people by adopting policies aimed at the:</p> <p>“...Natural resources situated in the soil and on the subsoil, the internal waters, in the sea, in the continental shelf, and in the exclusive economic zone are property of the State.”</p>	<p>By implementing the environmental management plan, the establishment will be in conformant to the constitution in terms of environmental management and sustainability.</p> <p>Ecological sustainability will be main priority for the proposed project.</p>
<p>Environmental Management Act (No. 7 of 2007) and its 2012 Environmental Impact Assessment (EIA) Regulations (Government Gazette (GG) No. 4878 Government Notice (GN) No. 30): <b>Ministry of Environment, Forestry and Tourism (MEFT)</b></p>	<p>The EMA has stipulated requirements to complete the required documentation to obtain an Environmental Clearance Certificate (ECC) for permission to undertake certain listed activities. The project activities are listed in the Regulations:</p> <p>-The (EIA) Regulations detail requirements for public consultation within a given environmental assessment process (GN 30 Section (S) 21). The EIA regulations also outline the required details of a Scoping Report (GN 30 S8) and an Assessment Report (GN 30 S15).</p>	<p>The ESA Study has been conducted in accordance with the EMA and its Regulation. This is presented under Chapter 6 of this Report.</p> <p>An ECC application has been launched with the MEFT. This Scoping Report and Draft EMP will be submitted to the Environmental Commissioner at DEAF for evaluation and consideration of the ECC.</p>

Legislation / Policy / Guideline: Custodian	Relevant Provisions	Implications for this project
<p>Pollution Control and Waste Management Bill (Guideline only):</p> <p><b>Ministry of Environment, Forestry and Tourism (MEFT)</b></p>	<p>The relevant parts of this Bill to the project are part 7 and 8.</p> <p>Part 7 states that any person who sells, stores, transports or uses any hazardous substances or products containing hazardous substances shall notify the competent authority, in accordance with sub-section (2), of the presence and quantity of those substances.</p> <p>The competent authority for the purposes of section 74 shall maintain a register of substances notified in accordance with that section and the register shall be maintained in accordance with the provisions.</p> <p>Part 8 provides for emergency preparedness by the person handling hazardous substances, through emergency response plans.</p>	<p>The Proponent should ensure compliance with the Bill requirements throughout the project cycle.</p>
<p>The Regional Councils Act (No. 22 of 1992):</p> <p><b>Ministry of Urban and Rural Development (MURD)</b></p>	<p>This Act sets out the conditions under which Regional Councils must be elected and administer each delineated region. From a land use and project planning perspective, their duties include, as described in section 28 “to undertake the planning of the development of the region for which it has been established with a view to physical, social and economic characteristics, urbanisation patterns, natural resources, economic development potential, infrastructure, land utilisation pattern and sensitivity of the natural environment.</p>	<p>The relevant Regional Councils are IAPs and must be consulted during the Environmental Assessment (EA) process. The project site falls under the Kunene Regional Council; therefore, they should be consulted.</p>
<p>Water Act 54 of 1956:</p> <p><b>Ministry of Agriculture, Water and Land Reform (MAWLR)</b></p>	<p>The Water Resources Management Act 11 of 2013 is presently without regulations; therefore, the Water Act No 54 of 1956 is still in force:</p> <p>Prohibits the pollution of water and implements the principle that a person disposing of effluent or waste has a duty of care to prevent pollution (S3 (k)).</p>	<p>The protection (both quality and quantity/abstraction) of water resources should be a priority.</p>

Legislation / Policy / Guideline: Custodian	Relevant Provisions	Implications for this project
	<p>Provides for control and protection of groundwater (S66 (1), (d (ii)).</p> <p>Liability of clean-up costs after closure/abandonment of an activity (S3 (l)). (l)).</p>	
<p>Water Resources Management Act (No 11 of 2013): <b>Ministry of Agriculture, Water and Land Reform (MAWLR)</b></p>	<p>The Act provides for the management, protection, development, use and conservation of water resources; and provides for the regulation and monitoring of water services and to provide for incidental matters. The objects of this Act are to:</p> <p>Ensure that the water resources of Namibia are managed, developed, used, conserved and protected in a manner consistent with, or conducive to, the fundamental principles set out in Section 66 - protection of aquifers, Subsection 1 (d) (iii) provide for preventing the contamination of the aquifer and water pollution control (S68).</p>	
<p>Fertilizers Farm Feeds and Agricultural Remedies Act No. 36 of 1947 and its 2007 Regulation: <b>Ministry of Agriculture, Water and Land Reform (MAWLR)</b></p>	<p>To provide for the appointment of a Registrar of Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies; for the registration of fertilizers, farm feeds agricultural remedies and stock remedies; to regulate or prohibit the importation, sale, acquisition, disposal or use of fertilizers, farm feeds, agricultural remedies and stock remedies; to provide for the designation of technical advisers and analysts; and to provide for matters incidental thereto.</p>	<p>The Proponent should ensure that they obtain relevant permits or licenses from the Directorate of Agricultural Extensions and Engineering Services (DAPEES) of the Ministry of Agriculture, Water and Land Reform (MAWLR) that are required for the operation of the irrigation activities.</p>
<p>Soil Conservation Act (No 76 of 1969): <b>Ministry of Agriculture, Water and Land Reform (MAWLR)</b></p>	<p>The Act makes provision for the prevention and control of soil erosion and the protection, improvement and conservation of soil, vegetation and water supply sources and resources, through directives declared by the Minister.</p>	<p>Duty of care must be applied to soil conservation and management measures must be included in the EMP for both the construction and operational phase.</p>

Legislation / Policy / Guideline: Custodian	Relevant Provisions	Implications for this project
Forestry Act (Act No. 12 of 2001): <b>Ministry of Environment, Forestry and Tourism (MEFT)</b>	<p>The Act provides for the management and use of forests and forest products.</p> <p>Section 22. (1) provides: "Unless otherwise authorised by this Act, or by a licence issued under subsection (3), no person shall on any land which is not part of a surveyed erven of a local authority area as defined in section 1 of the Local Authorities Act, 1992 (Act No. 23 of 1992) cut, destroy or remove - (a) vegetation which is on a sand dune or drifting sand or on a gully unless the cutting, destruction or removal is done for the purpose of stabilising the sand or gully; or (b) any living tree, bush or shrub growing within 100 m of a river, stream or watercourse."</p>	The site is medium to high vegetated in some areas by camelthorn shrubs and young trees, of which the camelthorn trees are protected species. The Proponent should notify the nearest Department of Environmental Affairs and Forestry (Forestry Division) at MEFT of any intention to remove such trees onsite at any stage of the Project. The permit to remove them (if the trees are obstructing operations) should be applied from the nearest Forestry office.
National Heritage Act No. 27 of 2004: <b>Ministry of Education, Arts and Culture (MEAC)</b>	To provide for the protection and conservation of places and objects of heritage significance and the registration of such places and objects; to establish a National Heritage Council; to establish a National Heritage Register; and to provide for incidental matters.	The Proponent should ensure compliance with this Acts' requirements, particularly during constructions (earthworks). The necessary management measures and related permitting requirements must be taken. This done by consulting with the National Heritage Council (NHC) of Namibia.
The National Monuments Act (No. 28 of 1969): <b>Ministry of Education, Arts and Culture (MEAC)</b>	The Act enables the proclamation of national monuments and protects archaeological sites.	The management measures should be incorporated into the Draft EMP.
Public Health Act (No. 36 of 1919): <b>Ministry of Health and Social Services (MHSS)</b>	Section 119 states that "no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health."	The Proponent and all its employees should ensure compliance with the provisions of these legal instruments.
Health and Safety Regulations GN 156/1997 (GG 1617): <b>Ministry of Health and Social Services (MHSS)</b>	Details various requirements regarding health and safety of labourers.	

Legislation / Policy / Guideline: Custodian	Relevant Provisions	Implications for this project
Public and Environmental Health Act No. 1 of 2015: <b>Ministry of Health and Social Services (MHSS)</b>	The Act serves to protect the public from nuisance and states that no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health.	The Proponent should ensure that the project infrastructure, vehicles, equipment, and machinery are designed and operated in a way that is not injurious or dangerous to public health.  The public and environmental health should be preserved and remain uncompromised.
Atmospheric Pollution Prevention Ordinance (1976): <b>Ministry of Health and Social Services (MHSS)</b>	This ordinance provides for the prevention of air pollution and is affected by the Health Act 21 of 1988. Under this ordinance, the entire area of Namibia, apart from East Caprivi, is proclaimed as a controlled area for the purposes of section 4(1) (a) of the ordinance.	The proposed project and related activities should be undertaken in such a way that they do not pollute or compromise the surrounding air quality.
Hazardous Substance Ordinance, No. 14 of 1974: <b>Ministry of Health and Social Services (MHSS)</b>	The ordinance provides for the control of toxic substances. It covers manufacture, sale, use, disposal and dumping as well as import and export. Although the environmental aspects are not explicitly stated, the ordinance provides for the importing, storage, and handling.	The Proponent should handle and manage the storage and use of hazardous substances on site so that they do not harm or compromise the site environment
Petroleum Products and Energy Act (No. 13 of 1990) Regulations (2001): <b>Ministry of Mines and Energy (MME)</b>	Regulation 3(2)(b) states that "No person shall possess or store any fuel except under authority of a licence or a certificate, excluding a person who possesses or stores such fuel in a quantity of 600 litres or less in any container kept at a place outside a local authority area.	The Proponent should obtain the necessary authorization from the MME for the storage of fuel on-site.



Legislation / Policy / Guideline: Custodian	Relevant Provisions	Implications for this project
Road Traffic and Transport Act, No. 22 of 1999: <b>Ministry of Works and Transport (Roads Authority of Namibia)</b>	The Act provides for the establishment of the Transportation Commission of Namibia; for the control of traffic on public roads, the licensing of drivers, the registration and licensing of vehicles, the control and regulation of road transport across Namibia's borders; and for matters incidental thereto. Should the Proponent wish to undertake activities involving road transportation or access onto existing roads, the relevant permits will be required.	Mitigation measures should be provided for road use and traffic safety.  The site access permit from the D3705 must be applied for and obtained from the Roads Authority.
Labour Act (No. 6 of 1992): <b>Ministry of Labour, Industrial Relations and Employment Creation (MLIREC)</b>	Ministry of Labour, Industrial Relations and Employment Creation is aimed at ensuring harmonious labour relations through promoting social justice, occupational health and safety and enhanced labour market services for the benefit of all Namibians. This ministry insures effective implementation of the Labour Act No. 6 of 1992.	The Proponent should ensure that the project activities do not compromise the safety and welfare of workers.
APPLICABLE INTERNATIONAL POLICIES, PRINCIPLES, STANDARDS, TREATIES AND CONVENTIONS		
STATUE	Provision	Implication for the Project
The United Nations Convention to Combat Desertification (UNCCD) 1992	Addresses land degradation in arid regions with the purpose to contribute to the conservation and sustainable use of biodiversity and the mitigation of climate change.  The convention objective is to forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas to support poverty reduction and environmental sustainability.	The project activities should not be such that they contribute to desertification.
Convention on Biological Diversity 1992	Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use.	Removal of vegetation cover and destruction of natural habitats should be avoided and where not possible minimised

Legislation / Policy / Guideline: Custodian	Relevant Provisions	Implications for this project
	Promote the protection of ecosystems, natural habitats, and the maintenance of viable populations of species in natural surroundings	
Stockholm Declaration on the Human Environment, Stockholm (1972)	It 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.	Protection of natural resources and prevention of any form of pollution.
<p><b><u>Other conventions include the following:</u></b></p> <ul style="list-style-type: none"> <li>• Convention on International Trade and Endangered Species of Wild Fauna and Flora (CITES), 1973,</li> <li>• Convention on Biological Diversity, 1992, and World Heritage Convention, 1972.</li> </ul>		

The Project activities, their alternatives and legal framework above will be undertaken in a specific environment, i.e., physical, biological and social environmental features as presented under the next chapter.

## 5 ENVIRONMENTAL AND SOCIAL BASELINE

The project activities will be undertaken in specific environmental and social conditions. The understanding of these conditions helps in identifying the sensitive environmental features that may need to be protected through the implementation of certain management and mitigation measures. The summary of selected physical, biological and social baseline information of the project area is provided below as per the site visit conducted by the Environmental Consultant on the 01<sup>st</sup> of December 2022 and relevant published reports and books.

The climatic conditions of the Kaoko-Otavi (project site area) are described using the available nearest data for the area obtained from World Weather Online and Meteoblue websites (2022).

### 5.1 Climate

#### 5.1.1 Temperatures

According to the World Weather Online (2022), the average high temperature for Kaoko-Otavi is 36°C, experienced in October and average minimum of 11°C in July. The average monthly high and low temperatures are shown in Figure 5-1. The maximum and minimum temperature for the area is 32°C and 11°C, respectively as shown in Figure 5-2.

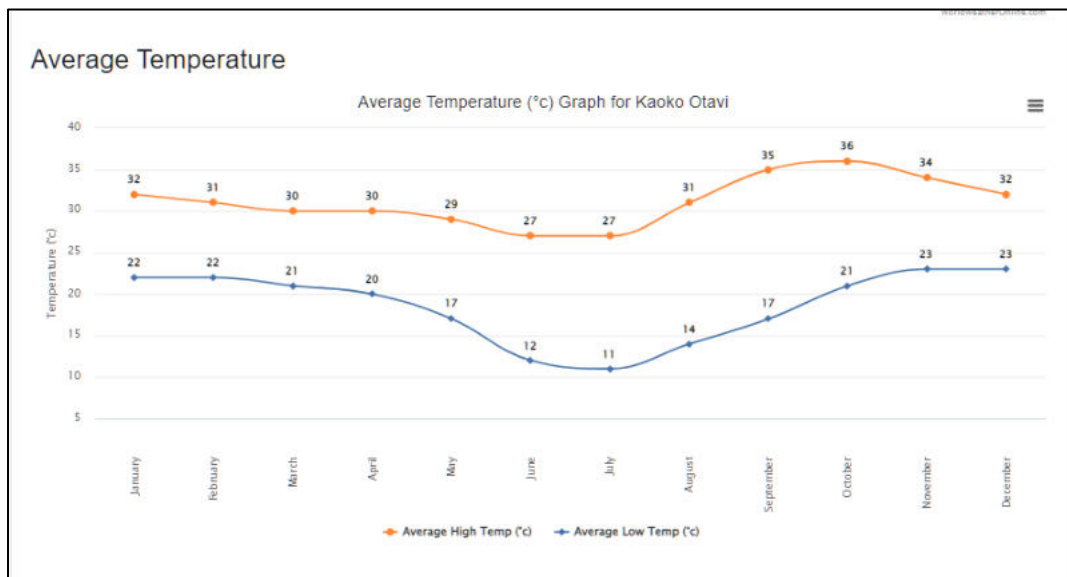
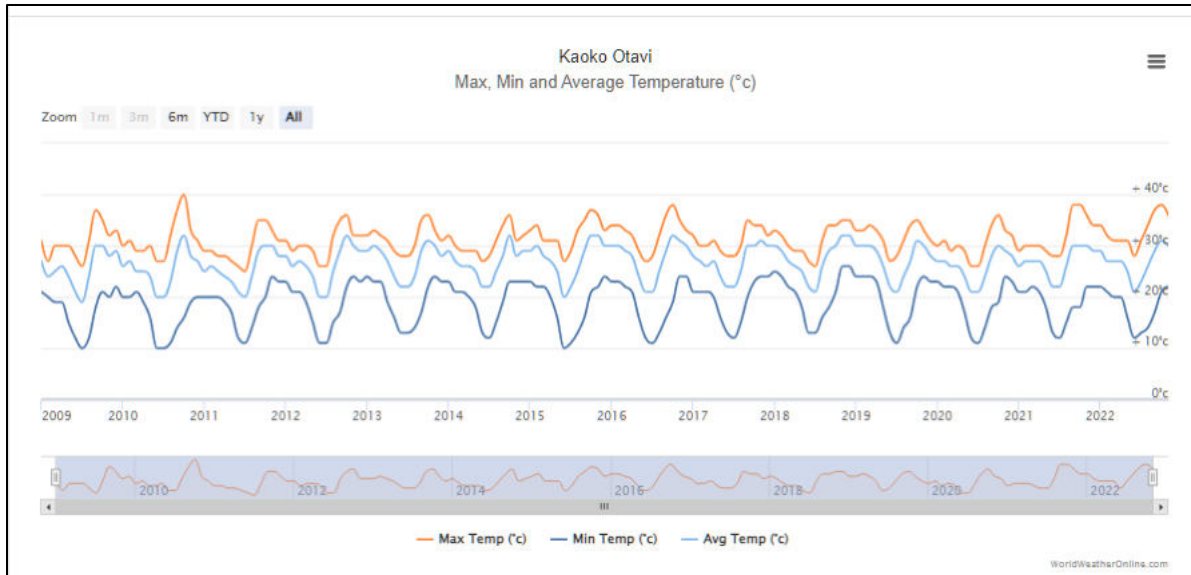


Figure 5-1: The monthly average temperatures for Kaoko-Otavi (World Weather Online, 2022)



**Figure 5-2: The maximum, minimum, and average temperatures for Kaoko-Otavi (World Weather Online, 2022)**

### 5.1.2 Rainfall

The average rainfall for Kaoko-Otavi for a period of thirteen (13) years, i.e., from 2009 to 2022 are shown in Figure 5-3. The Kaoko-Otavi area experiences good rains between November and March, with the highest rainfall recorded in December 2011 (490mm when it rained for 11 days), followed by February 2009 with 410mm when it rained for 16 days.

The annual rainfall and rain days averages for the area are shown in Figure 5-2 (A) rainfall graph. According to the World Weather Online (2022) graph of Kaoko-Otavi area, the month of January experienced the highest average rainfall of about 180mm when it rained for 15 days, followed by December with 171mm (rained for 6 days) as shown in Figure 5-3 (B).



Figure 5-3: A-The annual rainfall & rainy days averages and B-monthly average rainfall for Kaoko-Otavi (World Weather Online, 2022)

### 5.1.3 Air and Wind

**Air:** the current known sources of air pollution in the area are dust emissions mainly from the local gravel and single-track roads in the area, particularly in dry and windy months.

**Wind:** The wind rose for Kaoko-Otavi from the Meteoblue modelled climate is shown in Figure 5-4 and indicates that the wind is dominantly blowing from South-West (SW) to North-East (NE) with the speed ranging mainly between 19 and 28km/h (Meteoblue, 2022).

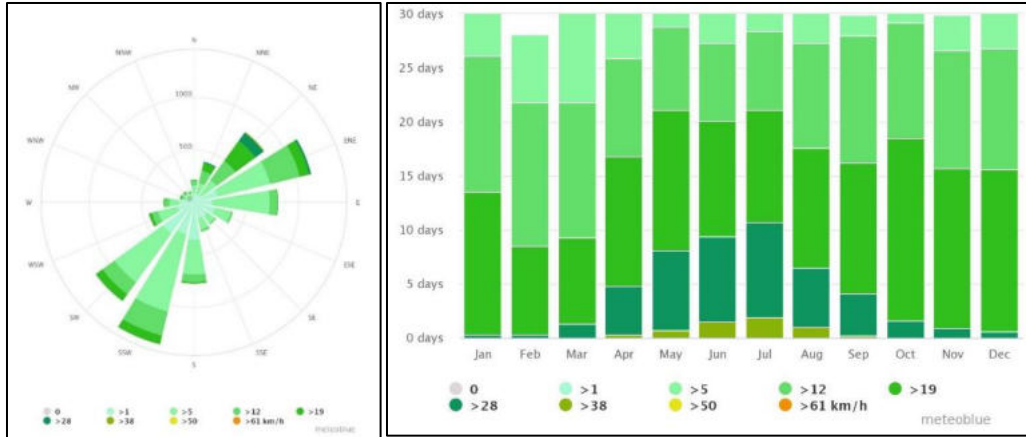


Figure 5-4: The wind rose for Kaoko-Otavi (Meteoblue, 2022)

## 5.2 Landscape and Topography

The Site is in a flat (low-lying) area and surrounded by mountains, with elevation ranging from 1,216 and 2,559 meters above sea level (masl) as shown in Figure 5-5. The Site landscape Karstveld, which according to Mendelson *et al* (2002) extends as a narrow, raised margin that encircles the lower-lying Owambo Basin in central northern Namibia. The rocks are dominated by limestone that dissolves easily in water, forming large underground caverns, lakes and aquifers. In this landscape, white calcrete rocks litter the surface in lower-lying areas.

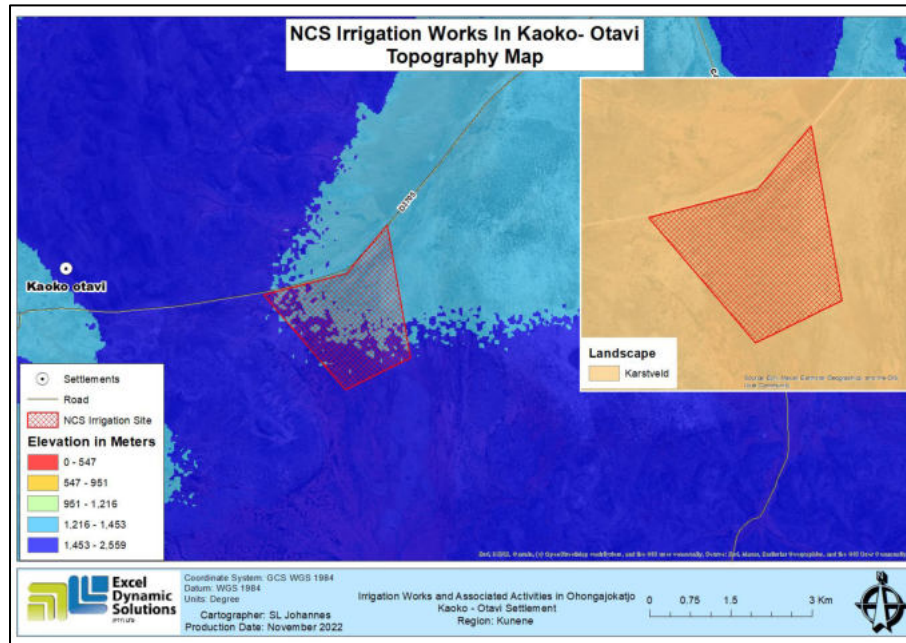


Figure 5-5: The Landscape and topography around the project site

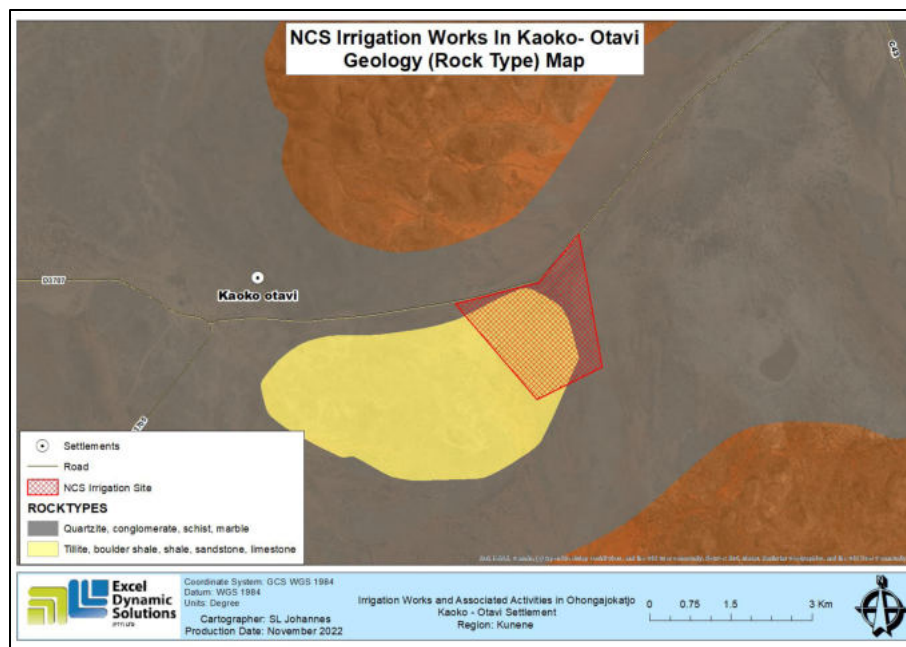
Some of the mountains further from the Site are shown Figure 5-6.



Figure 5-6: some of the mountain overlooking the Site

### 5.3 Geology and Soil

The geology of the area is characterized by rocks of the Otavi Group (Mendelson *et al*, 2002). The Site overlain by the relatively thin layer of sandy loamy and calcrete cover of the Kalahari Group. The sediments are underlain by visible protruding rock units of limestone, shale, and sandstone covering the western part of the Site, with the eastern part underlain by schists, quartzite and marble as shown on the geology map in Figure 5-7.



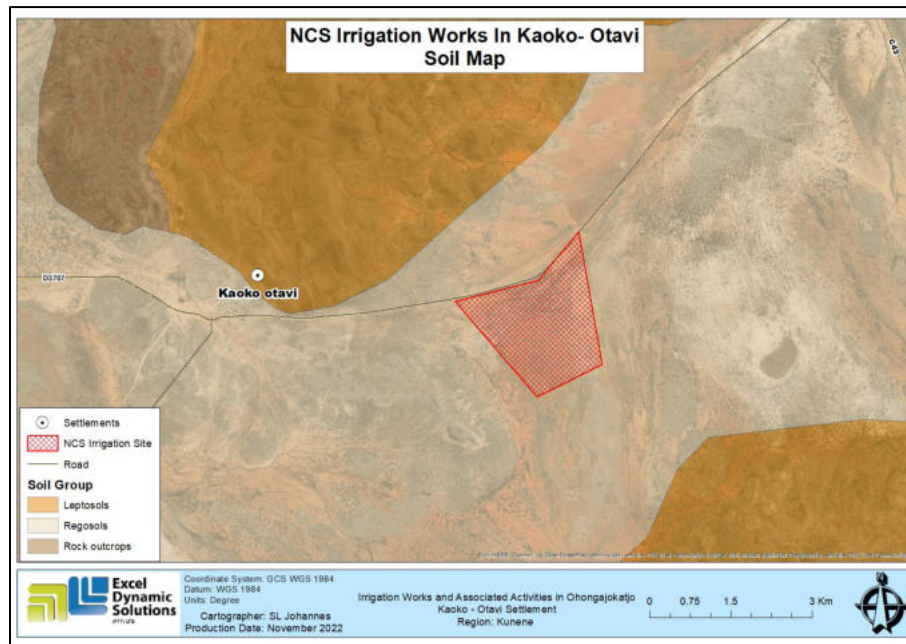
**Figure 5-7: The geology of the Site and surrounding areas**

The rock units observed onsite during site visit are shown in Figure 5-8.



**Figure 5-8: The weathered sandstone and limestone onsite**

In terms of soil, the site is overlain by the Regosols as shown on the dominant soil map in Figure 5-9. According to Mendelson *et al* (2002), these are medium-or fine-textured soils of actively eroding landscapes, the thin layers lying directly above the rock surfaces from the which they are formed. These soils never reach depths of more than 50cm.



**Figure 5-9: The dominant soil found within and around the site**



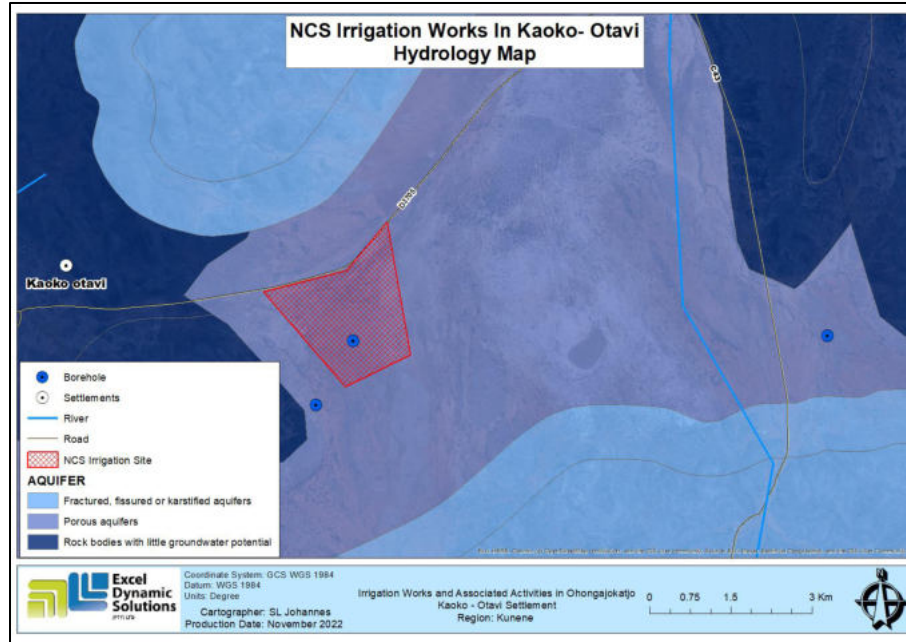
Typical soil found onsite comprises of light brown sandy and gravely loamy, and calcrete (Figure 5-10).



**Figure 5-10: The thin soil cover observed onsite**

#### **5.4 Water Resources: Groundwater and Surface Water**

The project area is found in the Namib and Kaokoveld groundwater basin and of moderate groundwater potential. The moderate potential may be explained by the presence of partially fractured dolomites in the area. In terms of groundwater potential, high yield can be found at areas where dolomites are in contact with other rock types, particularly the non-porous sandstone, conglomerate and quartzites of the Nosib and Mulden Groups, weathering is enhanced by karstification processes (Christelis and Struckmeier, 2001). The groundwater map in Figure 5-11 shows that the Site is within a porous aquifer. There are boreholes within an around the Site. These supply sufficient water for the communities which is used by both human (domestic water needs) and livestock.



**Figure 5-11: The hydrology and groundwater of the Project area**

In terms of groundwater quality, according to some laboratory analysis done by NamWater in 2016 for the Opuwo town boreholes, the water quality in the town and surrounding areas is classified as Excellent to Low Risk i.e., Group A to Group C. The groundwater quality of the area is therefore regarded as good quality potable water (GCS Water & Environmental Consultants, 2017).

There are no surface water bodies mapped nor observed on and around the Site. There are two streams/ephemeral rivers mapped to the eastern (near C43 road) and further west of the Site as shown on the map in Figure 5-11 above.

## 5.5 Biodiversity: Fauna and Flora

### 5.5.1 Fauna

The Project area is mainly communal land with subsistence farming, which is done with large and small livestock. The known and observed livestock occurrence are cattle, donkeys, sheep, goats. Some livestock observed within the vicinity of the Site are shown in Figure 5-12.



Figure 5-12: The livestock observed around the Site (donkeys, goats and sheep)

### 5.5.2 Flora

According to Mendelson *et al* (2002), the vegetation structure of the Opuwo area and Kaoko-Otavi is characterized by woodlands, which are typical for northern Namibia. The dominant vegetation in the Project area is woodland shrubs as shown on the vegetation map in Figure 5-13. The observed vegetation in the Site area and onsite are shrubs and young trees of red-thorn/black-thorn camelthorns (*Vachellia reficiens* and *mellifera*), and the purple-pod cluster-leaf or purple-pod terminalia (*Terminalia prunioide*). The camelthorn trees are protected under the Forestry Act, therefore, a permit to remove them (if necessary) will be required.

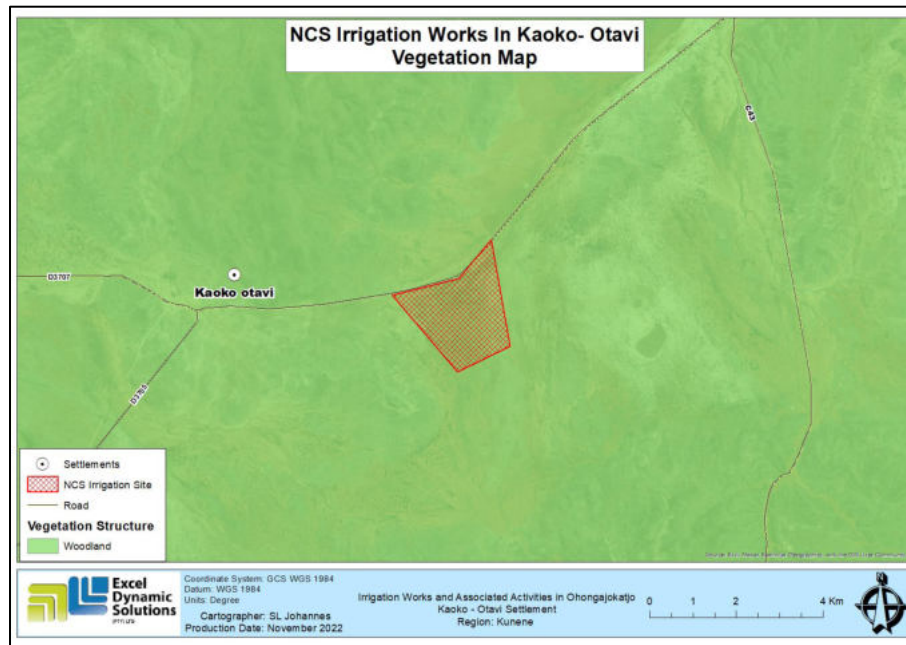


Figure 5-13: Dominant vegetation map of the Site area

Some of the common vegetation species observed within the Site are shown in Figure 5-14.

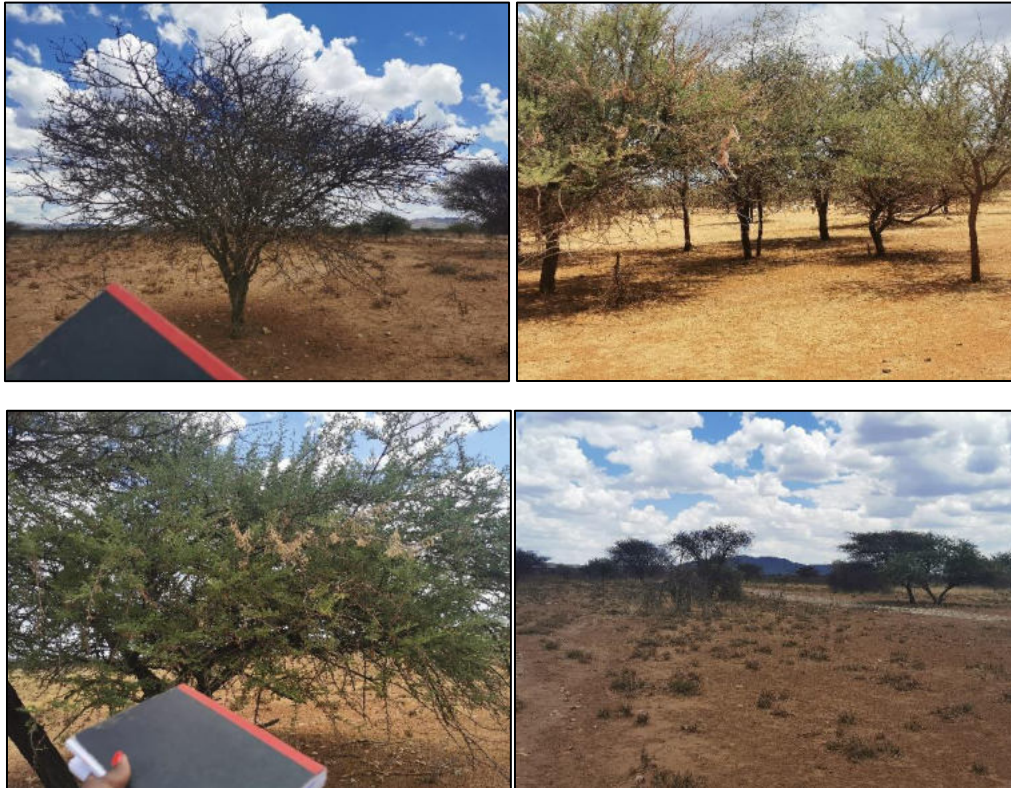


Figure 5-14: The camelthorn and *Terminalia prunioides* shrubs and young trees within the Site

## 5.6 Social Conditions

### 5.6.1 Demography

The Kunene Region has a total population of 86,856 as per the 2011 National Population and Housing Census. Of the total population, 43,253 were females and 43,603 were males (Namibia Statistics Agency, 2011).

The Project falls within the Opuwo Rural constituency, which was separated from the single Opuwo Constituency to form Urban and Rural Constituencies. In 2011, the Opuwo Constituency had a population of 27,272 of which 7,657 was urban population (leaving the rural population at 19,615). Of the 27,272 population of the Constituency, 13,896 were females and 13,376 were male. The constituency has a literacy of 62%, with 42% having left school, 11% at school and 43% never attended school by 2011. Approximately 63% of the inhabitants in the constituency are economically active of which 59% are formally employed and 41% unemployed (Namibia Statistics Agency, 2011).

## 5.7 Economic Activities

The main sources of income of the Constituency as per the Namibia Statistics Agency (2014) were farming (47%), wages & salaries (27%), cash remittance (3%), business, non-farming (12%) and pension (10%).

### 5.7.1 Agriculture and Farming

Livestock production is one of the key sources of livelihood to many rural households of the Kunene Region (Kunene Regional Council, 2015). The trading of animals during formal auctions especially in Outjo, Kamanjab, Khorixas and informal sales in Opuwo, creates a source of income for farmers residing in these constituencies. The exportation of animals from Kunene Region to neighboring countries continues to boost the economy of the Region. In support of the industry, the Government established five Quarantine camps to improve the quality and health of animals marketed namely, at Swartbooi Drift, Ehomba, Khowarib, Condor, Palmwag, Otjakati and Omutambo-maowe, which is situated in Omusati Region but under the jurisdiction of Opuwo state veterinary office (Kunene Regional Council, 2015).

From a local perspective, the communal farms keep livestock such as cattle, sheep, goats, donkeys as well as horses

### 5.7.2 Mining

Kunene Region offers great opportunities for mineral exploration due to its rock and mountainous formations, which are pivotal for regional economic growth and development. Exploration and discovery of mineral resources is at an advanced stage and if found economically viable, could contribute significantly to the economic growth of the Region ((Kunene Regional Council, 2015).

According to the Namibia Chamber of Mines' 2013 annual review, the Koako Base Metals Project have discovered Okanihova Copper targets and confirmed that there is a body of Iron-Ore at Otuziru (e.g., Lead, Zinc and Silver deposits). In addition, Teck Namibia Limited have also been exploring for Copper in the Kunene Region (Kunene Regional Council, 2015).

Apart from some exploration licenses in the Region, there are several small-scale miners who own and operate mining claims in the area and wider area of the Kunene Region. Through the mining claims, the communities generate minimal income through mined element (i.e., Copper, Zinc, Iron, etc.) sales.

### 5.7.3 Tourism

According to the Kunene Regional Council (2015), Kunene Region is classified as a prime tourist destination due to its rugged landscapes and ancient traditional diversity and practices. Tourism has been identified as a key economic sector for the region, predominated by wild animals in national parks and conservancies. The potential for further tourism development is very high due to its scenic beauty, wildlife, and the culture of its inhabitants.

Eco-tourism in joint operations with community-based natural resource management is likely to be one of the region's major economic drivers. This is due to the continuous increase in the region's wildlife numbers, which has led to the region becoming a major eco-tourism destination. The creation of conservancies has boosted direct economic benefit to the communities' region-wide, to the communal areas of Kunene Region. There are currently 37 registered communal conservancies in the Kunene Region, representing 46% of the total registered conservancies in the country of 79 (Kunene Regional Council, 2015).

### 5.7.4 Infrastructure and Services

The Kunene Region has some grave and tarred roads. According to the Kunene Regional Council (2015), Kunene Region has coverage of 545 kilometres of tarred road connecting all major towns such as Outjo, Khorixas, Kamanjab and Opuwo. However, some areas in the Region are not accessible due to poor road infrastructure and the lack of bridges along river channels contributes to transport challenges during rainy seasons. The landscape of the region is mountainous making it difficult to reach communities living in up-hill and valley areas.

In terms of other services and infrastructure on a local perspective, the Site area is well equipped, and the following crucial services are as follows:

- Road network: The Site is accessed from the D3705 via the local single-track roads.
- Electricity supply and water supply: The communities have electricity and some use solar energy for power supply. The community boreholes supply water to the community and according to the communities the water is sufficient for their domestic needs. The Site has existing boreholes, about nine of which five will be used for the Project.
- Telecommunication services: The Site area has good network coverage. The main providers of this service in the area are Telecom Namibia and MTC Namibia.

### **5.8 Archaeology, Cultural and Heritage Aspects**

During enquiry on known archaeological sites within the Site during the consultation meeting with the community members in Kaoko-Otavi, there are no known archaeological and heritage resources or sites recorded nor mapped on the surface of the Site.

To fulfil the requirements of the EMA and its 2012 EIA Regulations (Public Consultation: Section 21 to 24), the EDS Consultants consulted and engaged the stakeholders (interested and affected parties) as presented under the next chapter.

## 6 PUBLIC CONSULTATION PROCESS

Public consultation forms an important component of an Environmental Assessment (EA) process. It provides potential Interested and Affected Parties (IAPs) with an opportunity to comment on and raise any issues relevant to the project for consideration as part of the assessment process, thus assisting the Environmental Assessment Practitioner (EAP) in identifying all potential impacts and to what extent further investigations are necessary. Public consultation can also aid in the process of identifying possible mitigation measures. Public consultation for this project has been done under the EMA and its EIA Regulations.

### 6.1 Pre-identified and Registered Interested and Affected Parties (IAPs)

Relevant and applicable national, regional, and local authorities, and other interested members of the public were identified. Pre-identified IAPs were contacted directly, while other parties who contacted the Consultant after project advertisement notices in the newspapers, were registered as IAPs upon their request. Newspaper advertisements of the project activities were placed in two widely read national newspapers in the Region (*The Namibian* and *New Era* Newspapers). The project advertisement/announcement ran for two consecutive weeks inviting members of the public to register as IAPs and submit their comments. The Stakeholders included the following:

- National Ministries and Institutions: Ministry of Mines & Energy, Ministry of Agriculture, Water and Land Reform, Ministry of Works and Transport (Roads Authority of Namibia), Ministry of Urban and Rural Urban.
- Regional and local authorities (regional council and constituencies and traditional authorities): Kunene Regional Council, Opuwo Rural Constituency and traditional authorities (Vita Royal House Traditional Authority).
- Affected communities, communal farmers as well as interested members of the public.

### 6.2 Communication with Stakeholders (Interested and Affected Parties)

Regulation 21 of the EIA Regulations details the steps to be taken during a public consultation process and these have been used in guiding this process. Communication with IAPs with regards to the project was facilitated through the following means and in this order:



### 6.2.1 Compilation of the Background Information Document (BID)

A non-technical summary of the Project activities (background information document (BID)) containing brief information about the project activities was compiled and hand delivered to the competent authorities (for ECC application and Project registration) and circulated to all pre-identified and all new registered IAPs (upon request).

### 6.2.2 Newspaper Advertising (Public Notification)

Project Environmental Assessment notices were published in *The Namibian* and *New Era* Newspapers dated 07 & 14 October 2022, respectively – Appendix D. The adverts briefly provided information on the project activities, location, inviting the public to the consultation meeting, to register as IAPs and submit their comments/concerns.

### 6.2.3 Consultation Meetings

A consultation meeting was scheduled and held on the 01<sup>st</sup> of December 2022 in Kaoko-Otavi. The meeting was scheduled for 10h00 at the DAPEES Hall. The meeting was attended by forty-four (44) people as per the photo shown in Figure 6-1.



**Figure 6-1: Consultation Meeting in Kaoko-Otavi (at the DAPEES Hall) on 01 December 2022**

The meeting minutes were taken and attached hereto as Appendix E.

### 6.2.4 Public Notices (Posters) and Public Comments Period

A3 size printed posters were placed in Kaoko-Otavi at the Store (Figure 6-2), Kunene Region Council in Opuwo (Figure 6-3), and Opuwo Rural Constituency Office in Otuni - Figure 6-4.



Figure 6-2: Public Notice at the Kaoko-Otavi Store entrance

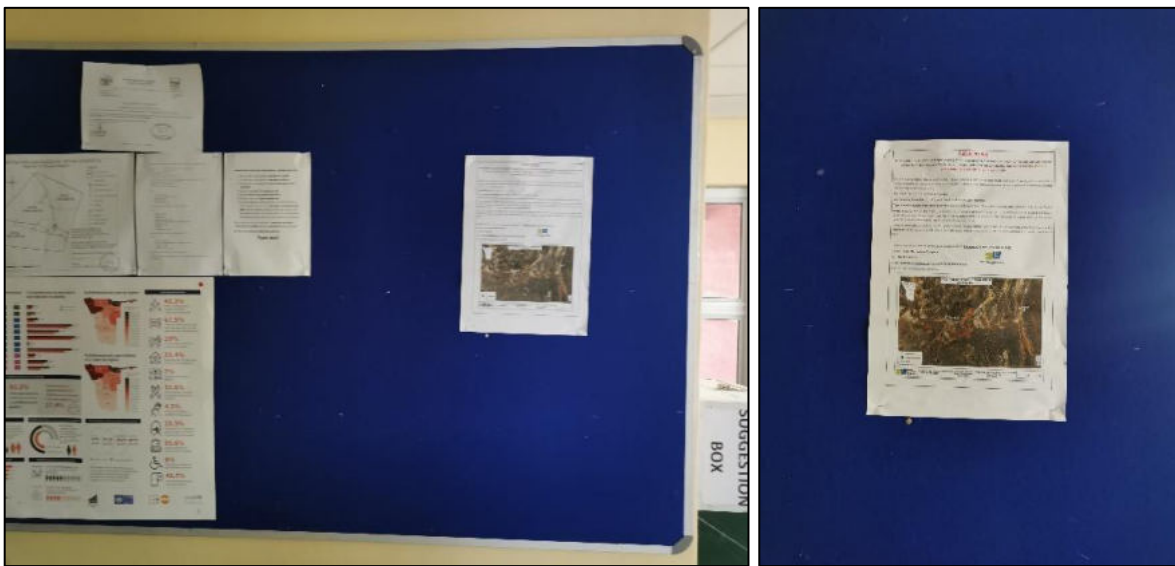


Figure 6-3: Public Notice at the Kunene Regional Council Office Notice board



Figure 6-4: Public Notice at the Opuwo Rural Constituency Office Notice board in Otuni

### 6.3 Feedback from Interested and Affected Parties

Issues were raised and comments submitted by IAPs from the consultation meeting (Table 6-1). These have been recorded and incorporated into the Scoping Report and EMP.

Table 6-1: Summary of main comments (and or issues) received during the consultation meeting

Aspects	Summary of the Concern / Issue
The outstanding familiarization trip to similar NCS projects	The NCS needs to communicate to the traditional leaders about the arrangements on the agreed trip to take leaders to the similar irrigation projects that NCS is managing. This was a condition to land allocation.
Local employment	Consider and prioritize local communities for jobs that they can do, and not bring outsiders for these types of jobs. This will also help to empower the locals.
Skills transfer	Training should be provided to locals for skills transfer.
Food security and improving lives	Strive to supply some food to communities to eradicate or at least improve food security even by 1 or 2%.

The comments and registration request period ran from 07 October to 28 October 2022 with an extension after the consultation meeting to 09 December 2022. Apart from comments made in the consultation meeting, there were no other comments or issues submitted to EDS Consultants during this period.

## 7 IMPACT IDENTIFICATION, DESCRIPTION AND ASSESSMENT

### 7.1 Impact Identification

The proposed irrigation activities are associated with certain positive and negative impacts. These are assessed to ensure that they are addressed by providing adequate mitigation measures such that an impact's significance is brought under control, while maximizing the benefits of the Project. The potential impacts associated with the project activities are as follow:

<u>Potential Positive impacts:</u>	<u>Potential Negative impacts:</u>
<ul style="list-style-type: none"> <li>-Job opportunities during project establishment and operations through appointed contractors and locals.</li> <li>-Contribution to local and regional social economic development through food security</li> <li>-Reduction on the national budget for offender's rations, by producing own food supply to the other NCS facilities in the country.</li> <li>-Provisions of food supply to the NAMPOL stations in the selected regions and local school feeding programs.</li> <li>-Increased support for local businesses through the procurement of locally available goods and services.</li> <li>-The project will serve as a training for offenders on irrigation as part of their rehabilitation to help them become productive and law-abiding citizens after serving times.</li> <li>-Helping at the site will keep the offenders busy to reduce idleness amongst them.</li> <li>-Safeguard the sustainable existence of Namibia's agricultural sector</li> </ul>	<ul style="list-style-type: none"> <li>-Physical disturbance to site soils/land during site establishment and pollution.</li> <li>-Increased soil erosion due to land irrigation</li> <li>-Groundwater resources over-abstraction may negatively affect the local aquifers.</li> <li>-Potential pollution of soils and water resources from seepage of fertilizers, pesticides, wastewater, and hydrocarbons.</li> <li>-Dust (air quality) generated by project related traffic travelling on gravel.</li> <li>-Noise generated by project related vehicle and equipment, and traffic from and to the site.</li> <li>-Impact on biodiversity due to potential removal of site vegetation and habitat destruction.</li> <li>-Health and safety: health and safety risks when handling waste, machinery and equipment during the operations.</li> <li>-Environmental pollution (solid waste generation) – wastes generated during the project phases may lead to environmental pollution.</li> <li>Vehicular Traffic safety – the project works may potentially put pressure on the existing roads when project materials and goods are delivered to/ from site.</li> <li>-Impact on archaeological and heritage resources from inadvertent destruction of subsurface sites/objects during earthworks.</li> </ul>

## 7.2 Impact Assessment Methodology and Criteria

The Environmental Assessment process primarily ensures that potential impacts that may occur from project activity are identified and addressed with environmentally cautious approaches and legal compliance. The impact assessment method used for this project is in accordance with Namibia's Environmental Management Act (No. 7 of 2007) and its Regulations of 2012, as well as the International Finance Corporation (IFC) Performance Standards.

The identified impacts were assessed in terms of scale/extent (spatial scale), duration (temporal scale), magnitude (severity) and probability (likelihood of occurring), as presented in Table 7-1.

To enable a scientific approach to the determination of the environmental significance, a numerical value is linked to each rating scale. This methodology ensures uniformity and that potential impacts can be addressed in a standard manner so that a wide range of impacts are comparable. It is assumed that an assessment of the significance of a potential impact is a good indicator of the risk associated with such an impact. The following process will be applied to each potential impact:

- Provision of a brief explanation of the impact.
- Assessment of the pre-mitigation significance of the impact; and
- Description of recommended mitigation measures.

The recommended mitigation measures prescribed for each of the potential impacts contribute towards the attainment of environmentally sustainable operational conditions of the Project for various features of the biophysical and social environment. The following criteria were applied in this impact assessment:

**Table 7-1: Criteria used for impact assessment (extent, duration, intensity and probability)**

The Criteria used to assess the potential impacts				
Extent or (spatial scale)- extent is an indication of the physical and spatial scale of the impact.				
Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
Impact is localised within the site boundary: Site only	Impact is beyond the site boundary: Local	Impacts felt within adjacent biophysical and social environments: Regional	Impact widespread far beyond site boundary: Regional	Impact extend National or over international boundaries
Duration- Duration refers to the timeframe over which the impact is expected to occur, measured in relation to the lifetime of the project				

The Criteria used to assess the potential impacts				
Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
Immediate mitigating measures, immediate progress	Impact is quickly reversible, short-term impacts (0-5 years)	Reversible over time; medium term (5-15 years)	Impact is long-term	Long term; beyond closure; permanent; irreplaceable or irretrievable commitment of resources
<b>Intensity, Magnitude / severity</b> - Intensity refers to the degree or magnitude to which the impact alters the functioning of an element of the environment. This a qualitative type of criteria				
H-(10)	M/H-(8)	M-(6)	M/L-(4)	L-(2)
Very high deterioration, high quantity of deaths, injury of illness / total loss of habitat, total alteration of ecological processes, extinction of rare species	Substantial deterioration, death, illness or injury, loss of habitat / diversity or resource, severe alteration, or disturbance of important processes	Moderate deterioration, discomfort, partial loss of habitat / biodiversity or resource, moderate alteration	Low deterioration, slight noticeable alteration in habitat and biodiversity. Little loss in species numbers	Minor deterioration, nuisance or irritation, minor change in species / habitat / diversity or resource, no or very little quality deterioration.
<b>Probability of occurrence</b> - Probability describes the likelihood of the impacts occurring. This determination is based on previous experience with similar projects and/or based on professional judgment				
Low (1)	Medium/Low (2)	Medium (3)	Medium/High (4)	High (5)
Improbable; low likelihood; seldom. No known risk or vulnerability to natural or induced hazards.	Likely to occur from time to time. Low risk or vulnerability to natural or induced hazards	Possible, distinct possibility, frequent. Low to medium risk or vulnerability to natural or induced hazards.	Probable if mitigating measures are not implemented. Medium risk of vulnerability to natural or induced hazards.	Definite (regardless of preventative measures), highly likely, continuous. High risk or vulnerability to natural or induced hazards.

### 7.3 Impact Significance

Impact significance is determined through a synthesis of the above impact characteristics. The significance of the impact “without mitigation” is the main determinant of the nature and degree of mitigation required. As stated in the introduction to this section, for this assessment, the significance of the impact without prescribed mitigation actions is measured.

Once the above factors (Table 7-1) have been ranked for each potential impact, the impact significance of each is assessed using the following formula:

$$\text{SIGNIFICANCE POINTS (SP)} = (\text{MAGNITUDE} + \text{DURATION} + \text{SCALE}) \times \text{PROBABILITY}$$

The maximum value per potential impact is 100 significance points (SP). Potential impacts were rated as high, moderate or low significance, based on the following significance rating scale (Table 7-2).

**Table 7-2: Significance rating scale**

<i>Significance</i>	<i>Environmental Significance Points</i>	<i>Colour Code</i>
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	1 to 30	L
Neutral	0	N
Low (negative)	-1 to -30	L
Medium (negative)	-30 to -60	M
High (negative)	<-60	H

**Positive (+)** – Beneficial impact

**Negative (-)** – Deleterious/ adverse Impact

**Neutral** – Impacts are neither beneficial nor adverse

For a potential negative impact with a significance rating of high (-ve), mitigation measures are recommended to reduce the impact to a medium (-ve) or low (-ve) significance rating, provided that the impact with a medium significance rating can be sufficiently controlled with the recommended mitigation measures. To maintain a low or medium significance rating, monitoring is recommended for a period to enable the confirmation of the significance of the impact as low or medium and under control.

For a potential positive impact with a significance rating of a medium (-ve) or low (-ve), mitigation measures are recommended to enhance the impact to a high (+ve) significance rating.

This assessment is based on the construction, operational and maintenance phase. The potential impacts stemming from the project activities onsite are described, assessed and mitigation measures provided under the sections below. Further mitigation measures in a form of management action plans are provided in the Draft EMP.

## 7.4 Assessment of Potential Negative (Adverse) Impacts

The significant negative impacts potentially associated with the project are assessed below. The management and mitigation measures to avoid and or minimize the impact significance are provided in the Draft EMP.

### 7.4.1 Soil Disturbance (Land Degradation)

The excavations and land clearing to enable erection of project structures and installation of services will potentially result in soil disturbance which will leave the site soils exposed and vulnerable to erosion. This impact would be probable at site areas with no to little vegetation cover to hold the soils in place. The movement of heavy vehicles and equipment may lead to compaction of the soils during construction phase. This will however be short-term and localized impact.

The potential impact can be rated as medium if no mitigation measures are implemented. However, with the effective implementation of mitigation measures and monitoring, the impact significance will be reduced to low. The impact is assessed in Table 7-3 below.

**Table 7-3: Assessment of the impacts of irrigation activities on soils**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M/H - 4	L/M - 4	M/H - 4	M - 44
Post mitigation	L/M - 2	L/M - 2	L - 2	L/M - 2	L - 12

### 7.4.2 Impact on Biodiversity (Fauna and Flora)

**Fauna:** The earthworks carried out during construction would result in land degradation, leading to habitat loss for a diversity of flora and fauna such as microorganisms and small organisms on vegetation and in the subsurface. The site activities will be limited within the site and trenching will only be done at specific site areas to erect structures and install service cables.



**Flora:** the direct impacts on flora and vegetation communities would mainly occur through clearing of the site shrubs to enable construction works and associated activities. The site is dominated by grass and sparsely to densely distributed shrubs and young trees. The camelthorn trees are protected species, therefore, a permit to remove them during de-bushing will be required. Therefore, the impact is manageable. The impact is assessed in Table 7-4.

**Table 7-4: Assessment of the impacts of project activities on biodiversity (fauna and flora)**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	M - 3	M - 3	M - 6	M/H - 4	M - 48
<b><u>Please refer to the EMP for Management and Mitigations measures</u></b>					
Post-mitigation	L/M - 2	L/M - 2	L/M - 4	L/M - 2	L - 16

### 7.4.3 Generation of Dust (Air Quality)

Dust emanating from site access roads when transporting project equipment, materials, and supply to and from site (time-to-time) may compromise the air quality in the area. Vehicular movements create dust even although it is not always so severe. Not only dust but also the possible emissions of gases from heavy vehicles and machinery. These sources of dust and emissions may lead to air pollution, thus decreasing the air quality in the project area. In a dry area like the project site and the environment is dry most of the year, and loose sandy nature of the substrate causes ambient fugitive dust levels. This could contribute to short-term decrease in air quality around the working site areas.

The dust generated and fumes emissions do not only impact people (health and visual) and fauna but also flora. Mainly for nearby flora, the fallout dust could temporarily affect the rates of photosynthesis and transpiration for the duration of construction activities, particularly.

The impact can be rated as medium (significance) if no mitigation measures are implemented. However, once this is done, the impact significance can be reduced to low - please refer to the assessment below (Table 7-5).

**Table 7-5: Assessment of the impacts of irrigation activities on air quality**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M/H - 4	M - 6	M - 3	M - 39
Post mitigation	L - 1	L - 1	L - 2	L/M - 2	L - 8

#### 7.4.4 Waste Generation

The two significant project phases (construction and operations) will be associated with the generation of different waste, ranging from domestic, sewage/wastewater, general waste to hazardous. If the generated waste is not disposed of in a responsible way, land pollution may occur not only within the site boundary but also the Site surroundings. Improper handling, storage and disposal of hydrocarbon products and hazardous materials for instance may lead to soil and groundwater contamination, in case of spills and leakages.

Without any mitigation measures, the general impact of waste generation has a medium significance. The impact will reduce to low significance, upon implementing the mitigation measures. The assessment of this impact is given in Table 7-6.

**Table 7-6: Assessment of waste generation impact**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M/H - 4	L/M - 4	M/H - 4	M - 44
Post mitigation	L - 1	L - 1	L - 2	L/M - 2	L - 8

#### 7.4.5 Occupational and Community Health, and Safety

The project construction but also operational activities can be associated with some health and safety risks. This is possible when personnel (workers) involved in the project activities are exposed to health and safety risks. These are in terms of accidental injury, owing to either minor (i.e., superficial physical injury) or major (i.e., involving heavy machinery or vehicles) accidents.

The use of heavy equipment, especially during excavation, and the presence of hydrocarbons on sites may result in accidental fire outbreaks. This could pose a safety risk to the project personnel, equipment, and vehicles.

If machinery and equipment are not properly stored and packed, there would be risks of this machinery or equipment falling and injure the project workers or visitors on site at the time.

The impact can be rated as medium significant if no mitigation measures are implemented, but upon implementation, the impact will be of low significance. This impact is assessed in Table 7-7 below and mitigation measures provided thereof.

**Table 7-7: Assessment of the impacts of the project activities on health and safety**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M - 3	M - 6	M/H - 4	M - 48
Post mitigation	L/M - 2	L/M - 2	L - 2	L/M - 2	L - 12

#### 7.4.6 Vehicular Traffic Use and Safety

The C43 (east of the Site) and D3705 (bordering the Site to the north) are the main transportation routes for all vehicular movement in the area, that also provide access to the Project site. Therefore, the project associated vehicles will obtain access to the site from this road (D3705). These two roads also connect the site area to the service providers (for water, waste removal, procurement of construction materials machinery, equipment). The same roads connect the Site to service providers during operational phase when transporting project materials to site and produce from site to consumers and generated waste to waste management facilities).

Depending on the project needs, trucks, medium and small vehicles will be frequenting the area to and from site. This would potentially increase slow moving heavy vehicular traffic along these roads. The impact would not only be felt by the district road users but the local road users such as community travelers (via local gravel and single-track roads). This would add additional pressure on the roads.

However, only so many times a week or even monthly that construction related slow moving heavy trucks will be transporting materials and equipment from and to site during construction. Therefore, the risk is anticipated to be short-term, not frequent, and therefore of medium significance. Traffic movement related to the project will however still be felt during the operational phase and this may exert pressure on the roads too and potential accidents. Pre-mitigation, the impact can be rated medium and with the implementation of mitigation measures, the significance will be low as assessed in Table 7-8 below.

**Table 7-8: Assessment of the impacts of project activities on road use (vehicular traffic)**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M/H - 4	L/M - 4	M/H - 4	M - 44
Post mitigation	L/M - 2	L/M - 2	L - 2	L/M - 2	L - 12

### 7.4.7 Noise

Noise from excavations and movement of heavy vehicles during constructions may be a nuisance. However, the noise would be localized (limited to the site) because the surrounding communities/neighbours are very far from Site earmarked for irrigation. Therefore, the impact of noise to people is very minimal to none. However, noise maybe a nuisance to livestock grazing within the Site or in the vicinity. Without any mitigation, the impact is rated as of low to medium significance. To change the impact significance from the pre-mitigation significance to low rating, the mitigation measures should be implemented. This impact is assessed in Table 7-9 below.

**Table 7-9: Assessment of noise impact**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	L/M - 2	L/M - 2	M - 6	M/H - 3	M – 30
Post mitigation	L - 1	L/M - 2	L - 2	L/M -2	L - 10

### 7.4.8 Water Resources Use: Demand and Availability

Water resources is impacted by project developments/activities in two ways, namely through pollution (water quality) or over-abstraction (water quantity) or at times both.

In terms of groundwater, the Project is in an area with good groundwater potential area. The area does not have permanent surface water source such as rivers, therefore it relies on schemes and drilled boreholes for water supply. The Project site and surroundings rely on groundwater supply via boreholes for domestic use and livestock watering.

The impact of the project activities on the resources would be dependent on the water volumes required by the project activities. Commonly irrigation activities use a lot of water, but this would also depend on the scale, technique, crop type and duration of water demand per year.

Upon approval of water use request/application by the MAWLR through the issuance of Groundwater Abstraction and Use Permit. If not maintained and used efficiently, this water volume may exert pressure on the aquifer in the long-term which will not only affect the sustainable supply to the Project, but also communities relying on the same source, especially when rainy seasons are not good enough to replenish the source.

Without the implementation of any mitigation measures, the impact can be rated as medium to high, but upon effective implementation of the recommended management and measures, the impact significance would be reduced to low as presented in the Table 7-10 below.

**Table 7-10: Assessment of the project impact on water resource use and availability**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M - 3	M - 6	M/H - 4	M – 48
Post mitigation	L/M - 2	L/M - 2	L - 2	L/M - 2	L - 12

#### 7.4.9 Soil and Water Resources Pollution

The proposed establishment of the irrigation project and subsequent operational activities are associated with a variety of potential pollution sources (i.e., fuels, and wastewater) that may contaminate/pollute soils and eventually groundwater and surface water. The anticipated potential source of pollution to water resources from the project activities would be hydrocarbons (oil) from project vehicles, machinery, and equipment as well as potential wastewater/effluent from construction related activities. Some of these sources of pollution will be temporary, i.e., they will only last for the duration of constructions works. The spills on the soils (depending on volumes spilled on the soils) from these machinery, vehicles and equipment could infiltrate into the ground and pollute the fractured or faulted aquifers on site, and with time reach further groundwater systems in the area.

However, some potential pollutants will impact the environment on a long-term during the operational phase when there are also additional potential pollutants such as herbicides, pesticides and fertilizers applied on the land for crop protection and growth.

There is also a potential risk of soil and water pollution from sewer effluent and refuse (from officers and offenders' accommodations and offices) through leakages or breaking of septic tanks or sewer ponds. If this effluent is not properly contained it may result into groundwater pollution and this is an on-going activity to manage this.

Pre-mitigation measure implementation, the impact significance is low to medium for the construction phase and medium to slightly high for the operational phase. Upon the implementation of management and mitigation measures, the significance will be reduced to medium and then progressively to low (for the operational phase) and then low for the construction phase. The impact is assessed in Table 7-11 below.

**Table 7-11: Assessment of the project impact on soils and water resources (pollution)**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M/H - 4	M - 6	M - 3	M - 39
Post mitigation	L - 1	L - 1	L - 2	L/M - 2	L - 8

#### 7.4.10 Archaeological and Heritage Resources

During construction works, historical resources may be impacted through inadvertent destruction or damage. This may include the excavation of subsurface graves or other archaeological objects. There was no information provided about either known heritage or site of significant cultural values within the Site boundaries. Therefore, the project activities will not have an impact of great significance on these and potentially other archaeological remains, at least on surface and visible resources if any. It should however be noted that the absence of confirmable and significant archaeological cultural heritage site is not evidence that such sites did not exist in the proposed site area.

With that said, the potential impact significance is slightly medium if no mitigation measures, are implemented. However, after the implementation of the measures provided below, this impact significance will be low. The assessment of the impact is shown in Table 7-12 below.

**Table 7-12: Assessment of the impacts of project activities on archaeological resources**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M/H - 4	M - 3	M - 6	M - 3	M - 39
Post mitigation	L/M - 2	L/M - 2	L - 2	L/M - 2	L - 12

### 7.5 Cumulative Impacts Associated with the Proposed Project Activities

The International Finance Corporation (2013) defines cumulative impacts as “those that result from the successive, incremental, and/or combined effects of an action, project, or activity (collectively referred to in this document as “developments”) when added to other existing, planned, and/or reasonably anticipated future ones”.

Like many irrigation projects, some of the cumulative impacts to which the proposed project and associated activities will potentially contribute are as follows:

- **Water use:** The volume of water required for irrigation activities will be significant and an add-on to the existing water uses from the boreholes. Therefore, the proposed project activities will cumulatively impact the water resources.
- **Road infrastructure.** The proposed project and its activities will cumulatively contribute (although temporarily) to various activities such as transportation of construction materials to site throughout the construction phase on D3705, farming activities and travelling associated with tourism through the project area within the Kunene Region. The contribution of the proposed project to this cumulative impact is however not considered significant given the scale, duration, and extent of the intended construction activities, particularly.

## 8 RECOMMENDATIONS AND CONCLUSIONS

The potential impacts that are anticipated from the project activities were identified, described, and assessed. For the significant adverse (negative) impacts with medium rating, appropriate management and mitigation measures were recommended for implementation by the Proponent.

The interested and affected parties (IAPs) and stakeholders were consulted as per the EMA and its 2012 EIA Regulations (Section 21 to 24). This was done via the two newspapers used for this environmental assessment, i.e., *New Era* and *The Namibian* of 07 and 14 October 2022. A consultation meeting was scheduled, meeting invitations sent to the registered IAPs and stakeholders. The meeting was held in Kaoko-Otavi on the 01<sup>st</sup> of December 2022. Some comments were made and raised on project activities during the consultation meeting.

The potential adverse impacts identified by the Environmental Consultant were found to be of medium rating significance. With the effective implementation the recommended management and mitigation measures, significance of these impacts will be reduced to low rating. To maintain the desirable rating, the implementation of management and mitigation measures, it is highly recommended that the Proponent or the construction Environmental Control Officer (ECO) to conduct the EMP implementation monitoring. Monitoring will not only be done to avoid impacts or maintain their desired rating, but to also ensure that all potential adverse impacts identified in this study and other impacts that might arise during Project implementation are properly and timely identified and addressed accordingly.

The Scoping assessment is deemed sufficient and conclude that no further detailed assessments are required to the ECC application.

Based on the assessment done for the proposed NCS facility and irrigation works (activities) in Kaoko-Otavi, the project and its associated activities do not pose a significant risk to the environment. However, it is highly recommended that the measures provided are effectively implemented and monitoring to protect the environment throughout the project duration.

### 8.1 Recommendations

The EDS Consultants are confident that the potential negative impacts associated with the project activities can be managed and mitigated by the effective implementation of the recommended management and mitigation measures. This would also be improved by more effort and commitment towards monitoring the implementation of these measures.



It is therefore recommended that an Environmental Clearance Certificate be issued for the proposed irrigation activities, subject to the following recommendations that:

- All required permits, licenses and approvals for the proposed activities should be obtained as required.
- The Proponent complies with the legal requirements governing this type of project and its associated activities.
- All mitigations provided in this Report and the management action plans in the draft EMP should be implemented and monitoring conducted as recommended.
- All the necessary environmental and social (occupational health and safety) precautions provided should be adhered to.
- Site areas where construction activities have been completed should be rehabilitated, as far as practicable, to their original state.
- The monitoring of the implementation of mitigation measures should be conducted, applicable impact's actions taken, reporting done and recorded as recommended in the Draft EMP.
- Environmental (EMP) Compliance Monitoring should be conducted on a weekly basis during construction by the project Environmental Control Officer or an independent Environmental Consultant and bi-annually during the operational phase. Environmental Compliance monitoring reports should be compiled and submitted to the DEAF.

## 8.2 Conclusions

Based on the assessment conducted for the proposed Site and its planned activities, the project and its associated activities do not pose a significant risk to the environment that would hinder its implementation. However, it is highly recommended that the measures provided are effectively implemented and monitoring to protect the biophysical and social environment throughout the project duration.

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