Excel Dynamic Solutions
(PTY) Ltd

Draft Environmental Management Plan (EMP):

The Proposed Establishment of Urban Agricultural Activities on Extension 5 in Karibib, Erongo Region

ECC Application No.: APP-001178

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TABLE OF CONTENTS

LIST OF FIGURES AND TABLE

1 INTRODUCTION

1.1 Project Background

Karibib Town Council (hereinafter referred to as The Town Council, KTC or Proponent) proposes to establish an urban agriculture on Extension 5 located about 2km southwest of Karibib Town (within the Townlands). The plots stretch from the edge of the Town until about 1km from Navachab Mine. The locality of the planned site is shown on the map in Figure 1-1.

Town planning activities and establishment such activities (urban agriculture) as proposed are one of the listed activities that require an EIA study and Environmental Management Plan (EMP) according to Section 27 (1) of the Environmental Management Act (EMA) (No. 7 of 2007) and its 2012 Environmental Impact Assessment (EIA) regulations as follows:

5. LAND USE AND DEVELOPMENT ACTIVITIES

- 5.1 *The rezoning of land from*
  (d) *use for nature conservation or zoned open space to any other land use*.

7. AGRICULTURE AND AQUACULTURE ACTIVITIES

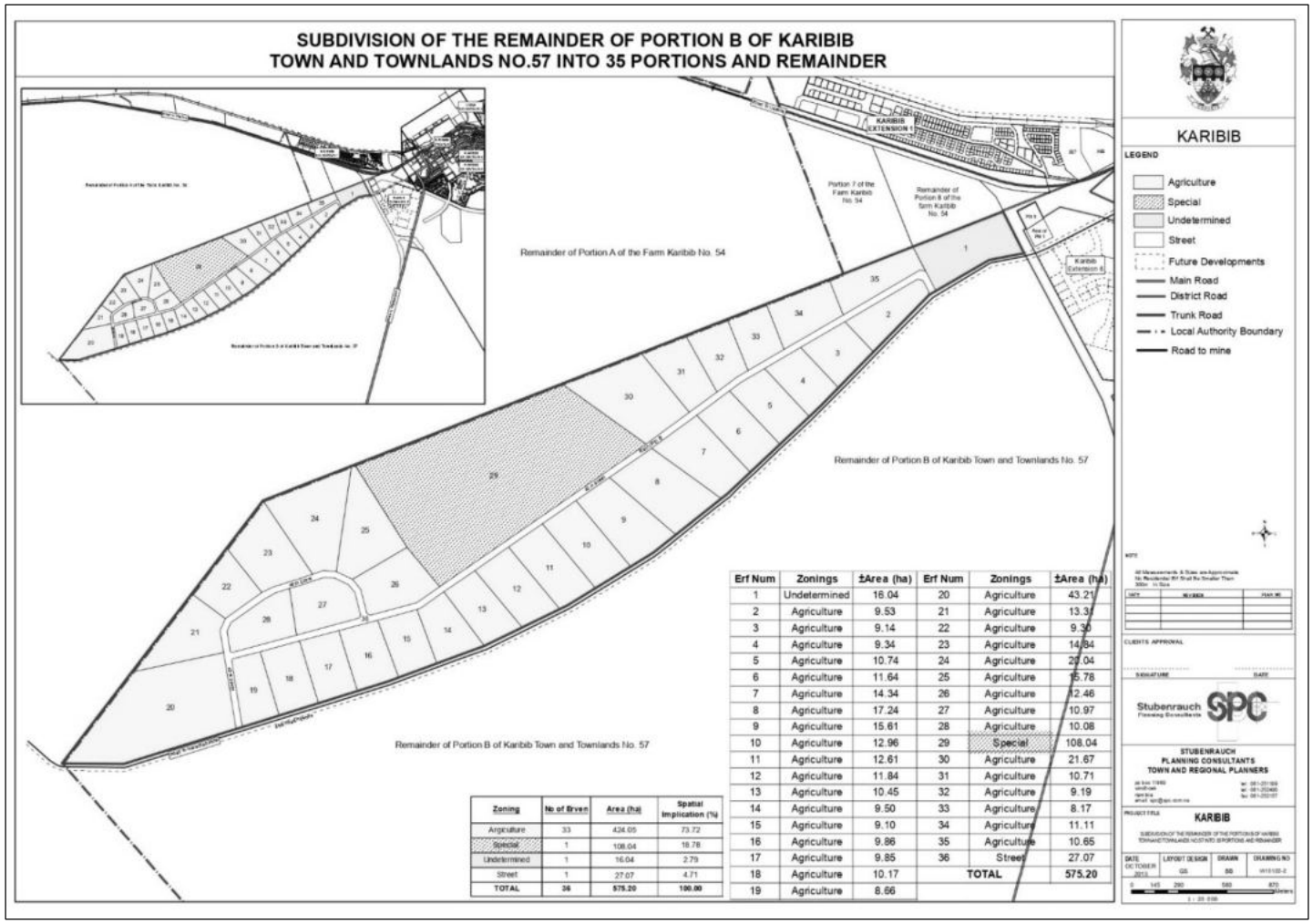
Associated activities

8. WATER RESOURCES DEVELOPMENT

Listed Activity 8.1: Abstraction of ground or surface water for industrial or commercial purposes.

Listed Activity 8.7: Irrigation schemes for agriculture excluding domestic irrigation

Subsequently, to ensure environmental management compliance of the proposed activities in the Town, the Proponent requires an Environmental Scoping Assessment (ESA) and Environmental Management Plan (EMP) developed and to apply for the project activities' ECC. The application for an ECC and the EMP will be submitted by Excel Dynamic Solutions (Pty) Ltd (EDS) to the Department of Environmental Affairs and Forestry (DEAF), Ministry of Environment, Forestry and Tourism (MEFT) for evaluation and consideration of the ECC.



Erf Num	Zonings	±Area (ha)	Erf Num	Zonings	±Area (ha)
1	Undetermined	16.04	20	Agriculture	43.21
2	Agriculture	9.53	21	Agriculture	13.35
3	Agriculture	9.14	22	Agriculture	9.30
4	Agriculture	9.34	23	Agriculture	14.84
5	Agriculture	10.74	24	Agriculture	20.04
6	Agriculture	11.64	25	Agriculture	15.78
7	Agriculture	14.34	26	Agriculture	12.46
8	Agriculture	17.24	27	Agriculture	10.97
9	Agriculture	15.61	28	Agriculture	10.08
10	Agriculture	12.96	29	Special	108.04
11	Agriculture	12.61	30	Agriculture	21.67
12	Agriculture	11.84	31	Agriculture	10.71
13	Agriculture	10.45	32	Agriculture	9.19
14	Agriculture	9.50	33	Agriculture	8.17
15	Agriculture	9.10	34	Agriculture	11.11
16	Agriculture	9.86	35	Agriculture	10.65
17	Agriculture	9.85	36	Street	27.07
18	Agriculture	10.17		TOTAL	575.20
19	Agriculture	8.66			

Zoning	No of Erven	Area (ha)	Spatial Implication (%)
Agriculture	33	424.05	73.72
Special	1	108.04	18.78
Undetermined	1	16.04	2.79
Street	1	27.07	4.71
TOTAL	36	575.20	100.00

Figure 1-1: Locality map of the proposed urban agriculture establishment in Karibib

1.2 Appointed Environmental Consultant and ECC Application

Subsequently, to ensure that the proposed activity is compliant with the national environmental legislation the project Proponent had to appoint an independent environmental consultant, EDS to undertake the required Environmental Assessment (EA) process (which entailed the compilation of this EMP) and apply for the ECC on their behalf.

The ECC application was compiled and submitted to MEFT as the environmental custodian for project registration purposes. Upon submission of an Environmental Scoping Assessment (ESA) Report and draft Environmental Management Plan (EMP), an ECC for the proposed project will be considered by the Environmental Commissioner at the MEFT's DEAF.

1.3 The Aim of the Draft Environmental Management Plan (EMP)

Regulation 8(j) of the EIA Regulations (2012) requires that a draft Environmental Management Plan (EMP) shall be included as part of the Environmental Assessment (EA) scoping report. A 'Management Plan' is defined as:

"…a plan that describes how activities that may have significant environments effects on the environment are to be mitigated, controlled and monitored."

An EMP is one of the most important outputs of the EA process as it synthesizes all the proposed mitigation and monitoring actions, set to a timeline and with specific assigned responsibilities. It provides a link between the impacts identified in the EA process and the required mitigation measures to be implemented during operation. It is important to note that an EMP is a statutory document and a person who contravenes the provisions of this EMP may face imprisonment and/or a fine. This EMP is a living document and can be amended to adapt to address project changes and/or environmental conditions and feedback from compliance monitoring.

The purpose of the Draft EMP is to ensure that the proposed project activities are undertaken in an environmentally friendly and sustainably manner. This would be done through the effective implementation of recommended environmental management and mitigation measures contained in the EMP, for which the aim is to avoid and or minimize the adverse identified impacts while maximizing the positive impacts.

2 BRIEF DESCRIPTION: URBAN AGRICULTURAL ACTIVITIES

This chapter comprises of the planned project activities as well as services infrastructure and resources required to commercially grow crops and produce food on Extension 5 agricultural plots. The proposed irrigation methods for the planned activities will probably be a Drip system.

Upon issuance of the ECC and obtaining the necessary and required documentations, the Proponent will then prepare for the actual works on the plots. The following subheadings are a presentation of the planned project activities/requirements in terms of input, processes, and outputs. The description of these project activities will ease the identification of the potential impacts, particularly the negatives impact for which are the focus of the ESA.

2.1 Planning and Design Phase

Once the ECC is issued, administrative and technical tasks completed, and the Town Council is ready, the establishment works, and associated activities will commence.

The required resources and services that will not require contractors will be provided by the Town Council during the establishment and operational stages of the project.

2.2 Site Clearing and Establishment Phase

The site is covered by sparse and dense vegetation in some areas. During this phase, earth works will be carried out in certain areas of the project site to install the necessary services infrastructure. The general site works will include site establishment and surveying. This will require soil excavation. There will be some movement of heavy vehicle and equipment on and around the site area in the Town.

2.3 Operational and Maintenance Phase

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

2.3.1 The Brief Description of the Proposed Irrigation Method

Drip Irrigation (DI)

According to Brouwer et al., (1985), drip (trickle) irrigation involves dripping water onto the soil at very low rates (2-20 litres/hour) from a system of small diameter plastic pipes fitted with outlets called emitters or drippers. Water is applied close to plants so that only part of the soil in which the roots grow is wetted, unlike surface and sprinkler irrigation, which involves wetting the whole soil profile. With drip irrigation water, applications are more frequent (usually every 1-3 days) than with other methods and this provides a very favourable high moisture level in the soil in which plants can flourish.

2.3.2 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 site boreholes and where necessary pumped from Town water supply,
- 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.

2.3.3 Harvesting and Processing

After the planting and growth period, the crop will then be carefully harvested, packaged for the market, and sold to local customers (residents) and where necessary, sold to outsiders and travellers.

It is currently expected that the harvest (site produce) will be transported from site to consumers on a weekly basis, but mainly dependent on consumer demand and delivery agreements.

2.4 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 availability. Given the fact that there would always be a need for food in the country, a complete decommissioning of the project activities is not anticipated at this stage.

3 LEGAL FRAMEWORK: AUTHORISATIONS AND PERMITS

The Proponent has the responsibility to ensure that all the dewatering and associated activities conform to the principles of the EMA and other relevant legal requirements as listed in the EIA Report. Table 3-1 below lists the requirements of an EMP as stipulated by Section 8 (e) of the EIA Regulations and associated governing legal requirements, primarily on specific approvals and permits that may be required for the proposed project activities.

Table 3-1: Applicable and required permits/authorizations/licenses for the project and its associated activities

Legislation/Policy/Guideline	Relevant Provision	Implication for the Project and Contact Institution/Person
Environmental Management Act (EMA) No. 7 of 2007	Requires that projects with significant environmental impacts are subject to an environmental assessment process (Section 27). The Act details principles which are to guide all EAs.	The EMA and its regulations should inform and guide this EA process. Should the ECC be issued to the Proponent, it should be renewed every 3 years, counting from the date of issue.
Environmental Impact Assessment (EIA) Regulations Government Notice 28-30 (Government Gazette 4878))	Details requirements for public consultation within a given environmental assessment process (Government Notice 30 Section 21). Details the requirements for what should be included in a Scoping Report (Government Notice 30 Section 8) and an Assessment Report (Government Notice 30 Section 15).	Contact details at the Department of Environmental Affairs and Forestry (DEAF), Ministry of Environment and Tourism (MET) **Office of the Environmental Commissioner (Attention: Mr. Timoteus Mufeti)** **Tel: +264 (0) 61 284 2701**
Fertilizers Farm Feeds and Agricultural Remedies Act No. 36 of 1947 and its 2007 Regulation	The registration of Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies; should be done to regulate or prohibit the importation, sale, acquisition, disposal or use of	The Proponent should ensure that they register these products and remedies to obtain relevant permits or licenses from the nearest Directorate of Agricultural Extensions and Engineering

Legislation/Policy/Guideline	Relevant Provision	Implication for the Project and Contact Institution/Person
	fertilizers, farm feeds, agricultural remedies, and stock remedies.	Services of the Ministry of Agriculture, Water and Land Reform (MAWLR).
Water Act No. 54 of 1956	The Act was aimed to control, conserve and use of water for domestic, agricultural, urban, and industrial purposes; to make provision for the control, in certain respects, of the use of sea water for certain purposes	The Regulations have been passed in December 2016 but have not yet been promulgated. Therefore, the Regulations of the 1956 Water Act still apply. The 2013 Water Act restricts water abstraction activities (for commercial purposes) without an authorised licence.
Water Resources Management Act No. 11 of 2013	Details on who and how water may be used. Section 45 describes "a person must not abstract/ irrigate and use water from a water resource unless the person holds a license issued by the Minister that authorises the abstraction and use of water from that water source.	
Forestry Act 12 of 2001, Amended Act 13 of 2005	Prohibits the removal of any vegetation within 100 m from a watercourse (Forestry Act S22 (1)). The Act prohibits the removal of and transport of various protected plant species.	Should there be protected plant species, which are known to occur within the actual project site footprints, and needs to be removed, a Permit should be obtained from the nearest Forestry office (Ministry of Environment, Forestry and Tourism (MEFT)) in Karibib or nearest Forestry prior to removing them. **Mr. Johnson Ndokosho (Forestry Director)** **Tel: +264 (0) 61 208 7666**
Petroleum Products and Energy Act (No. 13 of 1990) Regulations (2001)	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	The Proponent should obtain the necessary authorisation form the MME for any fuel storage on-site.

Legislation/Policy/Guideline	Relevant Provision	Implication for the Project and Contact Institution/Person
	quantity of 600 litres or less in any container kept at a place outside a local authority area".	**Carlo Mcleod (Ministry of Mines and Energy: Acting Director – Petroleum Affairs)** **Tel: +264 (0) 61 284 8291**
National Heritage Act (Act No. 27 of 2004)	The Act makes provision for the protection and conservation of places and objects of heritage significance and the registration of such places and objects. Part V Section 46 of the Act prohibits removal, damage, alteration, or excavation of heritage sites or remains, while Section 48 sets out the procedure for application and granting of permits such as might be required in the event of damage to a protected site occurring as an inevitable result of development. Part VI Section 55 Paragraphs 3 and 4 require that any person who discovers an archaeological site should notify the National Heritage Council. Section 51 (3) sets out the requirements for impact assessment. Should any objects of heritage significance be identified during the site clearing and excavations, the work must cease immediately in the affected sites and the necessary steps taken to seek authorisation from the Council.	Director of the National Heritage Council of Namibia (NHC): **Mrs. Erica Ndalikokule** OR Regional Heritage Officer at the NHC **Ms. Agnes Shiningayamwe** Tel: +264 (0) 61 301 903
The National Monuments Act No. 28 of 1969	The Act enables the proclamation of national monuments and protects archaeological sites.	
The Road Traffic and Transport Act No. 52 of 1999 and its 2001 Regulations	Provides for the control of traffic on public road and the regulations pertaining to road transport, including the licensing of vehicles and drivers.	**Mr. Eugene de Paauw** (Roads Authority- specialist Road legislation) Tel: +264 (0) 61 284 7072

4 DRAFT EMP IMPLEMENTATION, ROLES & RESPONSIBILITIES

As the project Proponent, Mandy Investment is ultimately responsible for the implementation of the EMP. However, they may delegate this responsibility at any time, as they deem necessary during the project phases (usually an environmental control officer or safety, health, and environmental person). The roles and responsibilities of all the parties involved in the effective implementation of this EMP are as follows:

4.1 Project (Site) Manager

Project or Site Manager (as appropriate) will be responsible for ensuring that project activities are completed on time, efficiently and sustainably. The manager's duties and responsibilities will include:

- Ensure that relevant commitments contained in the EMP Action Plans are adhered to.
- Ensure the relevant staff is trained in procedures entailed in their duties.
- Maintain records of all relevant environmental documentation for the project.
- Through consultations and cooperation with the ECO/SHE officer, issuing fines to individuals who may be in breach of the EMP provision and if necessary, removing such individuals from the site.
- Cooperate with all relevant interested and affected parties/stakeholders.
- Development and management of schedules for daily activities in compliance with the EMP.
- Ensuring compliance with relevant environmental and related authorisations and license conditions.
- Identifying and appointing of appropriately qualified specialists (were necessary) to undertake the programmes in a timeous manner and to acceptable standards.

4.2 Establishment Contractor

The Contractors' representative or site supervisors (as appropriate) will be required to:

- Ensure that the relevant commitments contained in the EMP Action Plans are adhered to.

- Compile relevant procedures and method statements for approval by the applicable phase site manager prior to initiation of activities.
- Ensure that all relevant staff are trained in procedures; and
- Maintain records of all relevant environmental documentation applicable to their work.

4.3 Safety, Health and Environmental (SHE) Officer

The Proponent may assign the responsibility of ensuring EMP compliance throughout the project life cycle to a designated member of staff or external qualified and experienced person, referred to in this EMP as the Safety, Health & Safety (SHE) Officer. The SHE Officer will have the following responsibilities:

- Ensure that relevant commitments contained in the EMP Action Plans are adhered to.
- Planning and carrying out site inductions to the workers on-site and visitors to the work areas of the site.
- Maintain records of all relevant environmental documentation for the project.
- Reviewing the EMP annually and amending the document when necessary.
- Management and facilitation of communication between the Proponent, and Interested and Affected Parties (I&APs) regarding this EMP.
- Conducting site inspections (recommended frequency is monthly during the establishment phase and bi-annually for the operation and maintenance) of all areas with respect to the implementation of this EMP (monitor and audit the implementation of the EMP).
- Advising the Proponent on the removal of person(s) and/or equipment not complying with the provisions of this EMP.
- Making recommendations to the Proponent with respect to the issuing of fines for contraventions of the EMP.
- Undertaking an annual review of the EMP and recommending additions and/or changes to this document.
- Ensuring that the operational activities on site operate according to the International System organization (ISO) standard 14001: 2015.

4.4 Technical Staff (Specialists) and or Consultants

The project's technical experts and consultants (or some of them) may potentially be involved in the project to safely and effectively monitor various technical parameters related to:

- mechanical designs of the irrigation systems and associated facilities
- waste management
- water resources management
- Soil preservation/ protection
- Irrigation systems' operations and maintenance
- Employee/ contractor health.

4.5 Archaeologist and related staff (for the Establishment Phase)

The potential presence of archaeological resources especially buried ones on site may require an archaeologist to be on site during site clearing and preparation for structure and services installation. This will be guided by the Archaeological Chance Finds Procedure (CFP). The CFP implementation roles include the following and as provided in Appendix 1.

- **Operator:** To exercise due caution if archaeological remains are found.
- **Foreman:** To secure site and advise management timeously.
- **Superintendent (Site manager):** To determine safe working boundary and request inspection.
- **Archaeologist**: To inspect, identify, advise management, and recover remains:

5 ENVIRONMENTAL MANAGEMENT & MITIGATION ACTION PLANS

The environmental management and mitigations measures (management plan actions) provided to the potential adverse impacts associated with the proposed project and its activities are presented under this chapter. The aim of these plan actions is to avoid these potential impacts where possible, and where impacts cannot be avoided, measures are provided to reduce the impacts' significance (as presented under the impacts' assessment chapter of the Scoping Report).

5.1 Key potential Negative/ (Adverse) Impacts

The summary of key identified potential adverse impacts for which the measures have been developed are as follows:

- Soil and water pollution: improper handling of wastewater or fertilisers may lead to pollution of surrounding soils and eventually water resources systems
- General environmental pollution through mishandling of project related waste.
- Impact on water resources (groundwater) through over-abstraction to supply the agricultural and related activities onsite.
- Loss of biodiversity through the removal of vegetation that may be found within the planned site of the Extension.
- Vehicular traffic: potential increase in local traffic due to site activities.
- Health and safety: improper handling of site materials and equipment may cause health and safety risks.
- Archaeological or cultural heritage impact through uncovering of unknown objects on site (when carrying out earthworks).

5.2 The Management and Mitigation of Potential Key Negative Impacts

The management and mitigation measures (action plans) for the potential adverse impacts are presented in Table 5-1 – for the planning & design, establishment, and subsequent operational and maintenance phase.

There will be some overlaps with regards to some potential impacts' occurrence during the establishment and operational phases, therefore potential impacts have not been separated for these project phases. The required management and mitigation plan actions have been presented together with key performance indicators, responsible person(s), resources and the timeline of such actions. These aspects form the headings of Table 5-1**,** and they are as follows:

- Environmental aspect and issues for which management actions are required.
- Proposed impact mitigation measures.
- Key performance indicator (KPI) for monitoring success levels of management actions.
- Responsible person(s) for implementing the proposed management actions.
- Resources required for implementing management actions and monitoring; and
- Implementation timeframes for the proposed management actions

Table 5-1: Management and Mitigation Measures for the Planning & Design, Establishment and Operational & Maintenance Phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
PLANNING & DESIGN PHASE						
EMP implementation and training	Lack of EMP awareness and implications thereof	-A Comprehensive Health and Safety Plan for the project activities should be compiled. This will include all the necessary health, safety, and environmental considerations applicable to respective works on sites. -An EMP non-compliance penalty system should be implemented on site. -The Proponent should appoint a SHE Officer to be responsible for managing the EMP implementation and monitoring.	-All required Plans and systems are compiled and in place Safety, Health and Environmental (SHE) Officer is appointed -Records of EMP implementation Plans and Systems -An SHE officer or ECO is appointed -ECC renewed on time	-Proponent	-Independent Environmental Consultant: EMP compliance and auditing -DEAF: site inspections for compliance -Identification of all persons involved in the implementation of the EMP	Pre-establishment
Irrigation system Technology	Mechanical and design failures	-The Proponent should ensure that the irrigation machinery and equipment are designed in such a way mechanical failure are minimal to none. -The watering system's design should make provision for water conservation.	-Sufficiently and appropriately designed irrigation systems	-Proponent (overall responsibility)	-Technical Expert (Planning & Design Engineer)	Pre-establishment
Authorizations	Lack of Permits/ Licenses	-All the required agreements and licenses or permits should be applied for and obtained The permits, agreements referred to herein include: ○ Petroleum storage permits (if fuel is stored on site) ○ Required fertilizers, agricultural remedies, and other project related feeds.	-Applicable permits and licenses to obtained from relevant authorities and kept on site for records keeping and future inspections	-Proponent	-Record of permits and authorizations obtained	Prior to establishment and operations

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
Stormwater management	Runoff of polluted water into the environment	-Stormwater management plans (discharge points) should be designed and implemented on site to prevent the potential contaminated water run-off from reaching surface water resources during heavy rain seasons.	-Stormwater discharge points incorporated into the irrigation design	-Proponent (holds overall responsibility)	-Technical staff (Planning & Design engineer)	Pre-establishment phase
Communication between the Proponent and surrounding land users	Lack of communication (proper liaison) with surrounding land users	-A clear communication procedure/plan which should include a grievance mechanism should be compiled.	-The grievance mechanism is in place	-Proponent	-Grievance logbook	Prior to establishment and throughout the subsequent phases
Employment	Creation of employment opportunities	-Project workers should be sourced from Karibib. -Equal opportunity should be provided for both men and women.	-Number and residence of locals employed	-Proponent -Establishment Contractor -Site Manager	-Constituency Council office to assist in identifying unemployed people	Pre-establishment activities
Specialised procurement of services	Design, establishment contractors, and services	-All services related to project activities such as establishment related works that the Proponent may need, preference should be given to local providers of such services. If not available locally, the services search should be extended to a regional level (Erongo Region).	-Number of hired contractors	-Proponent -Establishment Contractor	-Record of hired or contracted companies or services providers	Pre-establishment As and when required for maintenance.
ESTABLISHMENT AND OPERATIONAL & MAINTENANCE PHASES						
EMP implementation and training	Lack of EMP awareness and implications thereof	-EMP trainings should be provided to all new workers on site. -All site personnel should be aware of necessary health, safety, and	-Compliance monitoring conducted daily during establishment -Bi-annual compliance for operations	-Proponent -SHE Officer	-Monitoring reports ECC renewed on time.	Throughout the establishment and operation phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		environmental considerations applicable to their respective work. -The implementation of this EMP should be monitored. -The site should be inspected, and a compliance audit done throughout on a bi-annual basis. -An EMP non-compliance penalty system should be implemented on site.	-Timely renewal of the Environmental Clearance Certificate (ECC) every 3 years		-Records of EMP training conducted	
Communication between the Proponent and surrounding land users	Lack of communication (proper liaison) between surrounding land users and Proponent	-A clear communication procedure/plan which includes a grievance and response mechanism should be compiled.	-PRO is appointed and part of the project personnel	-Proponent -PRO	-Grievance logbook -surrounding land users/ communities	Communication to run throughout the project phases.
Soils	Site soils (land) disturbance Soil erosion	-The topsoil stripped from certain site areas to enable establishment works and can be returned to its initial position, should be returned. -Soils that are not within the intended footprints of the site areas should be left undisturbed and soil conservation implemented as far as possible. -Project vehicles/machinery should stick to access roads provide and or meant for the project operations but not to unnecessarily create further tracks resulting in soil compaction.	-Record any evidence of new traffic tracks outside of designated access roads by means of photographs. -Record evidence of new erosion gullies (photographs)	-SHE Officer -Proponent	-N/A	Throughout the establishment phase through operational phase

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-Access roads should be designed appropriately in a manner that disturbs minimal land areas as possible. -Make use of the existing road network and avoid off-road driving.				
	Soil pollution	-Spill control preventive measures should be in place on site to management soil contamination, thus preventing and or minimizing the contamination from reaching groundwater bodies. Some of the soil control preventive measures are: *Maintain equipment and fuel storage tanks to ensure that they are in good condition thus preventing leaks and spills. *The oil storage and use locations should be visually inspected for container or tank condition and spills. *Maintain a fully provisioned, easily accessed spill kit. Spill kits should be located throughout the active project sites contain the floor dry absorbent material and absorbent booms, pads, mats. *All project employees should be made aware of the impacts of soil pollution and advised to follow appropriate fuel delivery and handling procedures. ***De**velop and prepare countermeasures to contain, clean up, and mitigate the effects of an oil spill. This includes keeping spill response procedures and a	-No complaints of pollutants on the soils -No visible oil spills on the ground or contaminated/pollution spots owing to establishment activities.	-SHE Officer	-Soil pollution preventive resources such as kits, drip trays, awareness, etc	Throughout the establishment and operational & maintenance phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		well-stocked cache of supplies easily accessible. -The site areas where hydrocarbons will be utilized, the surface should be covered with an impermeable plastic liner (e.g., an HDPE liner). -Project machines and equipment should be equipped with drip trays to contain possible oil spills when operated. -All wastewater and hydrocarbon substances and other potential pollutants associated with the project activities should be contained in designated containers on site and later disposed of at nearby approved waste sites. -Polluted soil must be collected and transported away from the site to an approved and appropriately classified hazardous waste treatment facility. -Washing of equipment contaminated with hydrocarbons, as well as the washing and servicing of vehicles should take place at a dedicated area, where contaminants are prevented from contaminating soil or water resources. -Toilet water should be treated using to prevent the waste from being a water pollution risk.				
Water Resources	Water use (quantity) and overutilization	-Water should be efficiently used by implementing water saving measures	-Proof or recording/ quantification of water saving efforts.	-Site Manager (holds overall responsibility) -SHE Officer	-Monthly records of water used	During the establishment and operational phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		such as recycle and re-use where necessary and possible. -Water storage tanks should be inspected daily to ensure that there is no leakage to minimize water wastage. -Water conservation awareness and saving measures should be made to all employees and become accountable.		-Establishment Contractor		
	Water resources (quality) and pollution	**SURFACE WATER** -All runoff materials such as hydrocarbons, wastewater and other potential contaminants should be contained on site in designated containers and disposed of accordingly. **GROUNDWATER** -Stormwater management plans (discharge points) should be designed and implemented on site to prevent the potential contaminated run-off from reaching water resources.	-Effluents contained and stored in designated containers.	-Proponent (holds overall responsibility) -SHE Officer -Establishment Contractor	-Non-permeable material to cover the ground surface at areas where potential pollutants are utilized. -Designated waste storage containers	-Throughout all the project phases
Biodiversity	Loss of Fauna and Flora	**Flora:** -Make use of the existing access roads as much as possible and avoid off-road driving leading to vegetation destruction. -A permit must be obtained from the Directorate of Forestry before any protected tree species is removed. The plant species include the Camelthorn. -No onsite vegetation should be cut or used for firewood related to the project's operations.	-Keep record of names of all protected plant species prior to site clearing. -Keep records of all vehicle-animal collision incidences. -No disturbance to unmarked site areas. -No complaints of livestock theft, snaring or killing related to the project personnel.	-The Proponent -Site Manager -SHE Officer	-Barricading tape (to indicate working areas)	-Throughout the phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-Care should be taken when carrying out vegetation clearing without destroying all the site vegetation. **<u>Fauna</u>** -Workers should refrain from killing or snaring any animal species (big or small) that may be found on and around the site. -The poaching or illegal hunting of wildlife in the surroundings areas strictly prohibited. -Environmental awareness on the importance of biodiversity preservation should be provided to the site contractors, workers, and visitors.				

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
Air Quality	Air quality (dust)	-All access roads leading to the site should have speed limits of no more than 40km/h to minimise the amount of dust generated by the vehicles, which will in turn minimise air quality concerns to any potential receptors. -Dust masks, eye protective glasses and other respiratory personal protective equipment (PPE) such as face masks should be provided to the workers on site operating or working at the excavated areas, where they may be exposed to dust.. -Project vehicles and heavy machines should not be left idling when not in use, such that they emit air polluting gases. -Project vehicles and machinery should be maintained through regular servicing to ensure that they do not release harmful and air polluting fumes while on and off site.	-Dust suppression measures implemented -Visible efforts to curb dust	-Proponent -SHE Officer -Establishment Contractors	-Grievance logbook -Vehicle and machinery mechanic to ensure that vehicles and machinery do not emit harmful gases due to malfunctions	Throughout the project phase
Noise	Noise	-Noise from project vehicles and equipment on site should be reduced to acceptable levels. -When high noise level machinery, workers should be equipped with personal protective equipment (PPE) such as earplugs to reduce noise exposure. These PPE should be regularly checked/tested for effectiveness and on detected malfunction, should be replaced as soon as possible.	-Weekdays activities during establishment -PPE provided to workers operating noisy equipment and in noisy site areas.	-Site Manager -SHE Officer -Establishment Contractor	-Clearly written placards with establishment hours in a day placed at the turn of the main roads	Throughout establishment

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
Health, Safety and Security	General health and safety associated with project activities	-All items for treatment as specified in the material safety data sheets (MSDS) for hazardous materials shall be available in the first aid kit. -Keep a comprehensive first aid kit at the working areas and working sites. -Emergency procedures for accidents shall be communicated to all workers. -Ensure that all workers know where the first aid kits are located and who is trained in administering in first aid. -As part of their induction, the project workers should be provided with an awareness training of the risks of mishandling equipment/materials on site as well as health and safety risk associated with their respective jobs. -An emergency preparedness plan should be compiled, and all personnel appropriately trained. -Workers should not be allowed to drink alcohol prior to and during working hours. -Workers should not be allowed on site if under the influence of alcohol.	Compilation of Comprehensive Health and Safety Plan.	-Proponent -Site Manager -SHE Officer -Establishment Contractor	-Health and Safety Policies	Prior to site setup activities and throughout the phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
	Occupational Health and Safety	-Workers and visitors should be properly equipped with adequate personal protective equipment (PPE) such as coveralls, gloves, safety boots, earplugs, safety glasses, etc. -The Proponent must avail adequate and appropriate PPE to all workers and visitors. -Timeously recording and reporting of all health and safety incidences.	-Regular health screening of workers .	-Site/Project Manager (holds overall responsibility) -SHE Officer	-Funds to acquire health and safety related equipment. -First Aid training for at least 1 personnel at each work site	Throughout the project phases and when required
Health and safety	Accidental fire outbreak	-at least one portable fire extinguisher should be provided at each plot. -No open fires to be created onsite.	-No wildfires recorded (due to presence of workers)	-Site Manager -SHE Officer	-Fire extinguishers (1 per vehicle) and 1 per working site	Throughout the phases
Archaeology and heritage	Accidental disturbance and destruction of archaeological or heritage objects and sites	-Caution should be exercised when carrying out excavations associated with the project activities if archaeological remains are discovered. -Identification of any archaeological significant objects onsite should not be disturbed but are to be reported to the project SHE Office or National Heritage Council offices for further instructions and actions. -Workers should be educated to not destroy or throw away but report to the SHE Officer of any unknown object found/discovered on site. -The Site manager should familiarise themselves with the National Heritage Council's Chance Find Procedure	-Preservation of all artefacts that are discovered around project area -Cessation of work upon discovery/unearthing of unknown objects	-Site Manager -Establishment Contractor -SHE Officer -	-Salvage equipment -Flag tapes -GPS (site marking) -Technical Staff/Consultant (Archaeologist to help identify and advise on heritage object discovery)	As and when required, prior to site setup activities and upon encounter. -Archaeologist to be present during the earth workings

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		(please refer to **Appendix 1 of this document**)				
Buried water supply pipelines	Damage or deformation Of pipelines that that may run through the plots	-Excavation works on top and within the servitude of the water supply pipeline should be avoided at all costs. -Mark the positions/route of buried water pipeline to avoid pipeline damages. -If possible, heavy trucks should avoid driving over plot areas that are known to have shallow pipelines or any related infrastructure buried -Project vehicles, equipment and machinery should not be parked and left/stored on areas where the buried pipeline is, respectively.	-Marked position of the buried pipelines and servitudes -No signs nor complaints of damaged pipelines	-Proponent -SHE Officer	-None	Pre-establishment
Littering and waste management	Environmental Pollution	-Project workers should be sensitized to dispose of waste in a responsible manner and not to litter. -No waste should be left scattered on site. -No waste should be buried or burned on site or anywhere else around the site. -All domestic and general waste produced daily should be contained until such that time it will be transported to designated waste site in Town. -The sites should be equipped with separate waste bins for different waste. -A penalty system for irresponsible disposal of waste on site and anywhere in the area should be implemented.	-Site wide evaluation of the general condition of all waste storage sites must be conducted as part of the bi-annual environmental audits -A register of all waste generated on site is kept on site. -No littering on and around the project site	-Proponent -Site Manager -Establishment Contractor -SHE Officer	-Funds to acquire waste storage bins/ drums; and transport all waste from the site. -Waste storage containers	Throughout the phases.

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
	Wastewater generated by workers and visitors (sanitation)	-Provision of toilet facilities for project workers and visitors (type of pit latrine and or chemical toilet). -Emptying of chemical toilets according to the manufacturer's specifications. Treating latrine waste to render non-polluting.	-Adequate toilet facilities on site.	-SHE Officer	-Chemical toilets or excavator (pit creation), waste treatment agents/chemicals	At site setup and throughout the phases
	Hazardous waste	-All hazardous materials shall be stored (on bunded area), handled and disposed of according to the applicable material safety data sheets (MSDS), as well as applicable regulations. -Hazard identification signage shall be erected at appropriate locations. -All hydrocarbon substances should be contained in designated containers on site and later disposed of at nearby approved waste sites.	-Site wide evaluation of the general condition of all hazardous waste storage sites must be conducted as part of the bi-annual environmental audits -A register of all waste generated on site is kept on site.	-Proponent -Establishment Contractor -SHE Officer	-Funds to acquire waste storage bins/ drums; and transport all waste from the site. -Waste storage containers	Throughout the phases.
Vehicular Traffic	Traffic safety	-The transportation of project materials, equipment and machinery should be limited to once a week. -The heavy truck loads should comply with the maximum allowed limit while transporting materials and equipment/machinery on the public and access roads. -The site access road(s) should be upgraded to an unacceptable standard to be able to accommodate project related vehicles.	-No complaints from members of the public regarding vehicular traffic issues related to the project -All personnel operating the project vehicles and machinery are appropriately licensed and possession of valid driving licenses. -Demarcated areas for parking, offloading, and	-Site Manager -SHE Officer -Establishment Contractor	-Vehicular traffic compliance to be included in the annual environmental audit reporting	Throughout the phases. Site access permit (s) to be applied for and obtained prior to commencement of establishment works

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-Drivers of all project phases' vehicles should be in possession of valid and appropriate driving licenses. -Vehicle drivers should adhere to the road safety rules. -Drivers should drive slowly (40km/hour), and be on the lookout for animals. -Project vehicles should be in a road worthy condition and serviced regularly to avoid accidents due to mechanical faults of vehicles. -Vehicle drivers should only make use of designated site access roads provided. -Vehicle's drivers should not be allowed to operate vehicles while under the influence of alcohol. -Make provision for safe materials and equipment offloading and loading areas on sites. -The site access roads should be equipped with road safety signs.	loading zones are on sites			

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
	Potential increase of prevalence of HIV and AIDS, as well as other sexually transmitted diseases (STIs) prevalence	-Train workers on health talks and training about the dangers of engaging in unprotected sexual relations which results in contracting HIV/AIDS and other sexual related infections. -Provision of condoms and sex education through distribution of pamphlets. These pamphlets can be obtained from local health facilities.	-No new infections recorded linked to the project workers	-SHE Officer	-Availability of condoms onsite -Sex Education awareness placards and posters onsite	During site setup and throughout the phases

APPENDIX 1: CHANCE FINDS PROCEDURE (AFTER KINAHAN, 2020)

Areas of proposed development activity are subject to heritage survey and assessment at the planning stage. These surveys are based on surface indications alone, and it is therefore possible that sites or items of heritage significance will be found during development work. The procedure set out here covers the reporting and management of such finds.

Scope: The "*chance finds*" procedure covers the actions to be taken from the discovery of a heritage site or item to its investigation and assessment by a trained archaeologist or other appropriately qualified person.

Compliance: The "chance finds" procedure is intended to ensure compliance with relevant provisions of the National Heritage Act (27 of 2004), especially Section 55 (4): "*a person who discovers any archaeological …. object ……must as soon as practicable report the discovery to the Council*". The procedure of reporting set out below must be observed so that heritage remains reported to the NHC are correctly identified in the field.

Responsibility:

Operator: To exercise due caution if archaeological remains are found.

Foreman: To secure site and advise management timeously.

Superintendent To determine safe working boundary and request inspection.

Archaeologist To inspect, identify, advise management, and recover remains.

Procedure:

Action by person identifying archaeological or heritage material.

a) If operating machinery or equipment stop work

b) Identify the site with flag tape

c) Determine GPS position if possible

d) Report findings to foreman

Action by foreman

a) Report findings, site location and actions taken to superintendent

b) Cease any works in immediate vicinity

Action by superintendent

a) Visit site and determine whether work can proceed without damage to findings

b) Determine and mark exclusion boundary

c) Site location and details to be added to project GIS for field confirmation by an archaeologist

Action by Archaeologist

a) Inspect site and confirm addition to project GIS

b) Advise NHC and request written permission to remove findings from work area

c) Recovery, packaging and labelling of findings for transfer to National Museum

In the event of discovering human remains

a) Actions as above

b) Field inspection by archaeologist to confirm that remains are human

c) Advise and liaise with NHC and Police

d) Recovery of remains and removal to National Museum or National Forensic Laboratory, as directed.