



Draft Environmental Management Plan (EMP):

The Proposed Irrigation Activities on Farm Skaapplaas No. 414 situated North of the Naute Dam in the Keetmanshoop District of the //Karas Region, Namibia

ECC Addendum Application Reference: App-004766

Document Version: Final

Author: Ms. Aili lipinge	Client: Mandy Investments Two Hundred and Ninety-Four (Pty) Ltd
Reviewer: Mr. Nerson Tjelos	Contact person: Mr. Bryan B. van der Merwe
Company: Excel Dynamic Solutions (Pty) Ltd	Telephone: +264 81 127 1129
Telephone: +264 (0) 61 259 530	Postal Address: Private Bag 1457, Okahandja
Fax2email: +264 (0) 886 560 836	Email: boss@iway.na
Email: info@edsnamibia.com	

November 2021

TABLE OF CONTENTS

LIST OF FIGURES	iii
LIST OF TABLES	iii
1 INTRODUCTION	1
1.1 Project Background	1
1.2 Appointed Environmental Consultant and ECC Application	3
1.3 The Aim of the Draft Environmental Management Plan (EMP)	3
2 BRIEF DESCRIPTION: THE PROPOSED IRRIGATION ACTIVITIES.....	4
2.1 Planning and Design Phase	4
2.2 Project Input and Resources Requirements	4
2.2.1 Project Personnel and Accommodation	5
2.2.2 Water Supply Requirements	5
2.2.3 Power supply	6
2.2.4 Other Services Infrastructures	6
2.3 Site Clearing and Construction Phase	7
2.4 Post-Construction Site Rehabilitation	7
2.5 Operational and Maintenance Phase	8
2.5.1 Project Processes and Outputs	8
2.5.2 The Brief Description of the Proposed Irrigation Method(s)	8
2.5.3 Crop Production Care and Water Use and Management	9
2.5.4 Harvesting and Processing	9
2.6 Decommissioning of Project Activities	10
3 DRAFT EMP IMPLEMENTATION, ROLES & RESPONSIBILITIES.....	14
3.1 Competent Environmental Monitoring Authority (DEAF of the MEFT)	14
3.2 Project (Site) Manager	14
3.3 Construction Contractor	15
3.4 Safety, Health and Environmental or Environmental Control Officer	15
3.5 Technical Staff (Specialists) and or Consultants	16
3.6 Archaeologist and related staff (for the Construction Phase)	16
4 ENVIRONMENTAL MANAGEMENT & MITIGATION ACTION PLANS	16
4.1 Key potential Negative/ (Adverse) Impacts	17
4.2 The Management and Mitigation of Potential Key Negative Impacts	17

LIST OF FIGURES

Figure 1: Location of Farm Skaapplaas No. 414 north of Naute Dam, in the //Karas Region....2

LIST OF TABLES

Table 1: Applicable and required permits/authorizations/licenses for the irrigation project and its associated activities 11

Table 2: Management and Mitigation Measures for the Planning & Design, Construction and Operational & Maintenance Phases 18

1 INTRODUCTION

1.1 Project Background

Mandy Investments Two Hundred and Ninety-Four (294) (Pty) Ltd (hereinafter referred to as The Proponent) intends to carry out irrigation activities on the privately owned Farm Skaapplaas No. 414 located about 10 km north of Naute Dam and about 40 km south of Keetmanshoop in the //Karas Region. The locality of the proposed project site (Farm Skaapplaas No. 414) is shown on the map in **Figure 1**.

The proposed project will entail the clearing and preparation of land, approximately 1300 ha in total, for lucerne (animal fodder) as known as Alfalfa (*Medicago sativa L*) cultivation for commercial purposes. The project land will be worked on and implemented in three phases, and these are as follows:

- Phase 1: 300 ha,
- Phase 2: a further 700 ha, and
- Phase 3: a further 300 ha (totaling 1300 ha).

The proposed irrigation scheme will consist of 26 rings of 50 ha each. It will also entail an irrigation infrastructure, comprising pipelines, balancing dam, abstraction pump station, to facilitate the planned irrigation works.

The irrigation projects and associated activities are however one of the listed activities in the 2012 Environmental Impact Assessment (EIA) Regulations of the Environmental Management Act No. 7 of 2007 that that may not be undertaken without an Environmental Clearance Certificate (ECC). The following are listed activities that are relevant to proposed project and its related activities:

- **“Regulation 8.1:** Abstraction of ground or surface water for industrial or commercial purposes.
- **Regulation 8.7:** Irrigation schemes for agriculture excluding domestic irrigation.
- **Regulation 9.2** Any process or activity which requires a permit, license or other form of authorization, or the modification of or changes to existing facilities for any process or activity which requires an amendment of an existing permit, license, or authorization or which requires a new permit license or authorization in terms of a law governing the generation or release of emissions, pollution, effluent, or waste.”

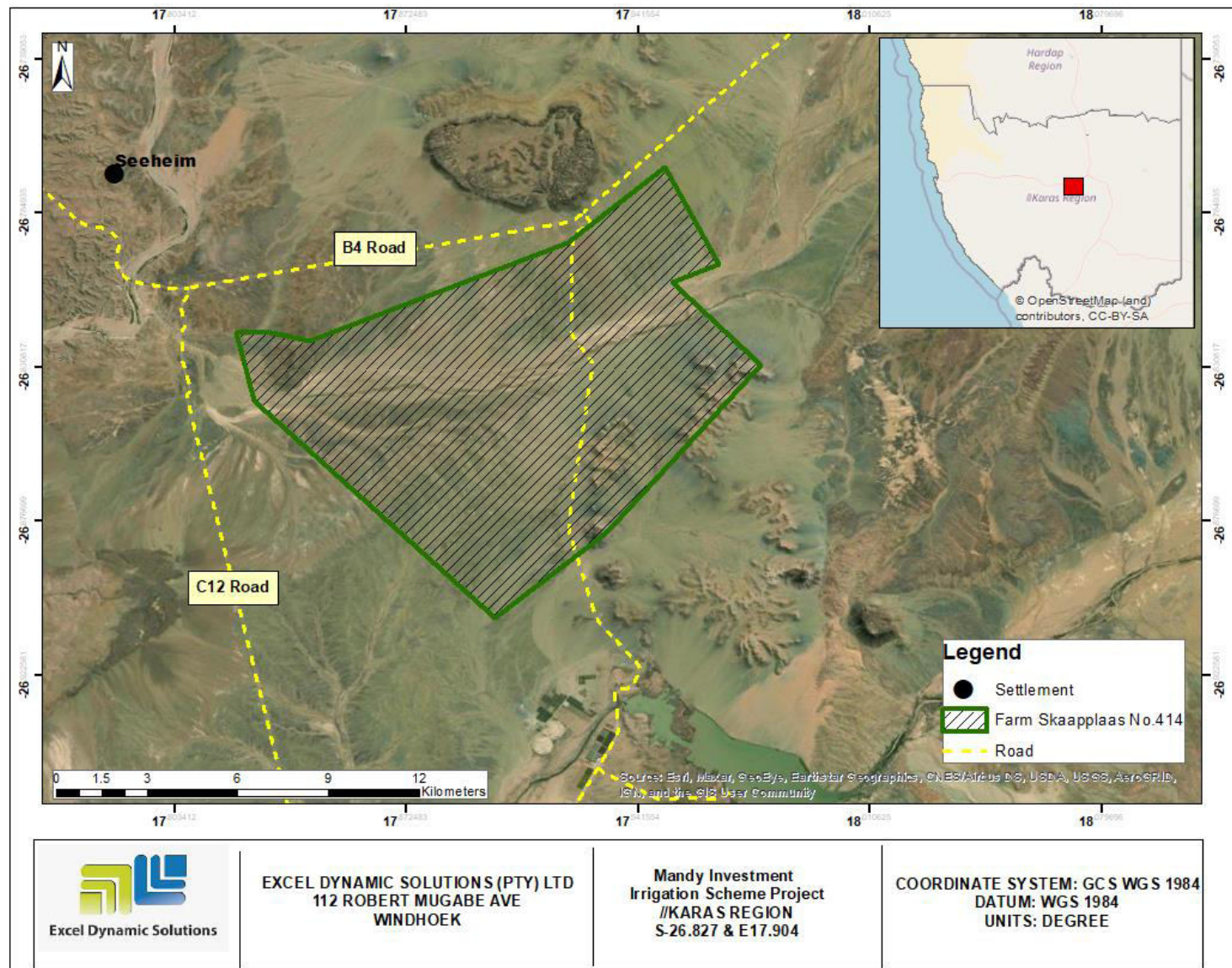


Figure 1: Location of Farm Skaapplaas No. 414 north of Naute Dam, in the //Karas Region

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 (Mandy Investment) had to appoint an independent environmental consultant, Excel Dynamic Solutions (Pty) Ltd 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 the Competent Authority (Ministry of Agriculture, Water and Land Reform (MAWLR)) on 09 June 2020. The date stamped copy of the ECC by MAWLR was also uploaded on the online portal for the Ministry of Environment, Forestry and Tourism (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 Department of Environmental Affairs and Forestry (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: THE PROPOSED IRRIGATION ACTIVITIES

This chapter comprises of the planned project activities as well as services infrastructure and resources required to commercially grow and produce lucerne or Alfalfa (*Medicago sativa L*) on the dedicated/demarcated irrigation land on Farm Skaapplaas No. 414 near Keetmanshoop. The proposed irrigation methods for lucerne cultivation are Centre Pivot and Drip systems. These methods are explained in detailed later in this chapter as well as under the Alternatives chapter.

It should be noted that the proposed project (irrigation) activities will only commence after issuance of the ECC by the Environmental Commissioner and securing of all required permits and or license that need to be obtained prior to implementation.

The planned project activities/requirements in terms of input, processes, and outputs are presented below.

For easy follow of information presentation, the project activities are provided based on implementation phases, i.e., the planning & design, construction, post-construction site rehabilitation, operational and maintenance as well as decommissioning. These phases are explained as follows.

2.1 Planning and Design Phase

Prior to construction, the irrigation site layout and works need to be planned for and designed by an appointed contractor (planning & design engineer, Turner Consulting are currently busy with this competent of the project).

2.2 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).

In terms of services infrastructure and human resources, the following will be required:

2.2.1 Project Personnel and Accommodation

The number of project personnel (staff) for setting up the project site (construction) is not yet known as this will be dependent on the human resources need by the appointed construction contractor. Similarly, the number of people to be employed for the actual irrigation works cannot be determined at this stage. Accommodation provision for the construction and operation phases is planned as follows:

- **Construction:** In terms of accommodation for the construction phase, it is anticipated that the project staff will be accommodated on temporary accommodation (tented campsite) near the site on Farm Skaapplaas.
- **Operational phase:** For the operational phase, permanent accommodation facilities will be constructed on the Farm Skaapplaas.

2.2.2 Water Supply Requirements

Water supply for both the construction and actual irrigation works will be sourced from the Naute Dam. The water will be provided to the project site via pipelines connected to the abstraction pump station at the Dam. For onsite domestic water use (including drinking), there will be industry standard water storage tanks onsite that will be refilled by the pipeline as often as necessary to ensure uninterrupted water supply to the project activities when needed. The estimated water requirements of lucerne, as referenced 'crop' on the planned 1,300 ha under Drip irrigation, is 21,411,000m³/annum. This water figure is anticipated for the entire project, i.e., Phase 1 to 3 but the initial irrigation works will only be done on the 300-ha portion of the land which will require much less annual water volume from the total of 21,000 000 m³).

Given the influence of climate change in an arid country like Namibia on developments, it cannot be indicated at this stage as to how soon would the project continue to the next phase (Phase 2 and then 3) of irrigating the remaining hectares of the total land. The progress may be hindered by certain factors such as a short in water supply from the Dam due to poor or no rainfall over a prolong period (considering other users depending on the same source), or other factors beyond the Proponent's control. And due to this, the Proponent might even be forced to either scale down on operations or temporarily cease operations until a better solution is found, or the situation improves. Regardless, progress reports would need to be submitted to the relevant regulatory and competent authorities as the actual project activities progress once in operation.

The Proponent has presented two irrigation methods for consideration, namely the Drip and Centre Pivot irrigation techniques. The two 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.

According to preliminary figures provided by the Proponent, with a Drip irrigation technique, 1 ha of lucerne would require an average of 16,470 m³ per annum totalling to about 4,941,000 m³ per annum to irrigate the 300 ha. The Centre Pivot irrigation technique would on 1 ha require an average of 20,270 m³ per annum (totalling to an average of 6,081,000 m³ to irrigate 300 ha). In an essence, and from an environmental perspective, the Drip irrigation technique would require about 1,140,000 m³ less than the Centre Pivot system per year to irrigate the 300 ha of land.

In an essence, and from an environmental perspective, the Drip irrigation technique would require about 1,140,000 m³ less than the Centre Pivot system per year to irrigate the 300 ha of land.

2.2.3 Power supply

The power required for construction work be supplied by the Construction contractor probably comprising temporary diesel generator sets.

For the operational phase, the main or preferred power supply is renewable energy (in the form of photovoltaic/solar) that will then be supplemented by electricity from the nearby NamPower grid. However, the final option is still to be confirmed once the engineering works/design are finalized.

For the development of the farm, the grid connection from NamPower will be considered. Power requirements will only be on small scale as irrigation itself will be gravity-fed.

2.2.4 Other Services Infrastructures

Other vital services that will be required for the project include the following:

- **Sanitation (sewage management):** For construction, there will be enough portable chemical toilet system on site. A pit latrine system with septic tanks will be considered for operations. A sewage removal and management contractor will be appointed to ensure that the systems are maintained, and waste disposed of as deem necessary.

- **Site Access (Roads):** The Irrigation area is accessible via the B4 main road which runs from Keetmanshoop towards Lüderitz or accessible from the C12 road which connects to the B4 main road from Aus.
- **Health and safety:** For all site project phases, workers will be well equipped with personal protective equipment (PPE) while performing tasks on site. A minimum of two first aid kits will be available at each working site.
- **Accidental Fire management:** The project working sites and vehicles will be equipped with fire extinguishers.
- **Site Fencing:** certain project sites and areas may need to be separated off by adding extra fencing to increase security and limit access (controlled site movements to certain areas for safety and security reasons).

2.3 Site Clearing 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 supporting structures.

The construction work will also include the installation of irrigation systems and associated infrastructure on the demarcated site areas on the Farm. 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 pumping station from the water source (Naute Dam) and project site pumps.

2.4 Post-Construction Site Rehabilitation

The following activities will be carried out to clean up and rehabilitate the site post-construction:

- 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 Keetmanshoop).
- 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.

2.5 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).

2.5.1 Project Processes and Outputs

As mentioned above, the preliminary information provided by the Proponent is that the proposed irrigation methods are Drip irrigation and Centre Pivot. However, it may also come to light that there will be a necessity to combine the two methods once implementation commences. The proposed irrigation model comprises 20 x 50ha units.

2.5.2 The Brief Description of the Proposed Irrigation Method(s)

A. Drip Irrigation

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.

A typical Drip irrigation system contains:

- A pump unit,
- Control head,
- Main and submains,
- Laterals, and
- Emitters or drippers.

B. Centre Pivot (Sprinkler) Irrigation description according to Phocaides (2007)

The Centre Pivot 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. 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.

2.5.3 Crop Production Care and Water Use and Management

The operational works will entail the following in terms of lucerne 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 Naute Dam to irrigation site on Farm Skaapplaas 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.

2.5.4 Harvesting and Processing

As commonly known, the Lucerne will be planted yearly, for a period of ten (10) to eleven (11) months (June to May) until harvesting and / or grazing (Green Team Consultants, 2019). After this planting and growth period, the lucerne will then be carefully harvested (into silage and hay) to ensure maximum feed quality, packaged for the market, and sold to local customers (farmers) as well as exported to the international market.

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.

2.6 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 a drainage basin via a dam like Naute, the life span of this irrigation project is generally more than 100 years. This is linked to the long term reliable safe yield of the dam, Naute for water use. Given the fact that there would always be a need for animal fodder in the country and for the international market, a complete decommissioning of the project activities is not anticipated at this stage.

.

Table 1: Applicable and required permits/authorizations/licenses for the irrigation 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 fertilizers, farm feeds, agricultural remedies, and stock remedies.	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 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.

Legislation/Policy/Guideline	Relevant Provision	Implication for the Project and Contact Institution/Person
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.	The 2013 Water Act restricts water abstraction activities (for commercial purposes) without an authorised licence. The Proponent will not be directly abstracting water from the Naute Dam which is operated by NamWater. Therefore, although it is not the Proponent's responsibilities to apply for the Water Abstraction and Use Permit from the Department of Water Affairs at the Ministry of Agriculture, Water and Land Reform (MAWLR), they still need to obtain a Water Supply Permit from NamWater and comply with the conditions stated therein.
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 required to be removed, a Permit should be obtained from the nearest Forestry office (Ministry of Environment, Forestry and Tourism (MEFT)) in Keetmanshoop prior to removing them. Contact Details at MEFT (Forestry Division) Tel: +264 (0) 63 221 650
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 quantity of 600 litres or less in any container kept at a place outside a local authority area”.	The Proponent should obtain the necessary authorisation from the MME for any fuel storage on-site. 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	Director of the National Heritage Council of Namibia (NHC): Mrs. Erica Ndalikokule

Legislation/Policy/Guideline	Relevant Provision	Implication for the Project and Contact Institution/Person
	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.	OR Regional Heritage Officers at the NHC Mr Manfred Gaeb and 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.	Eugene de Paauw (Roads Authority- specialist Road legislation) Tel: +264 (0) 61 284 7072

3 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:

3.1 Competent Environmental Monitoring Authority (DEAF of the MEFT)

The Department of Environmental Affairs and Forestry (DEAF) of the Ministry of Environment, Forestry and Tourism (MEFT) as the environmental custodian is responsible for enforcing compliance with the EMA, its regulations and full implementation of this EMP. The authority is also responsible for the reviewing of biannual reports submitted by the Proponent and grant ECC renewal after every 3 years following an environmental audit.

3.2 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.

3.3 Construction 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.

3.4 Safety, Health and Environmental or Environmental Control 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 Environmental Control Officer (ECO) or Safety, Health & Safety (SHE) Officer. The ECO/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 construction 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.

3.5 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.

3.6 Archaeologist and related staff (for the Construction 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:

4 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).

4.1 Key potential Negative/ (Adverse) Impacts

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

- Land degradation (physical soil disturbance) resulting in increased soil erosion,
- Biodiversity Loss of biodiversity through site clearing to enable construction,
- Potential impact on water resources (abstraction and pollution)
- Potential pollution of soils and water resources from seepage of fertilizers, pesticides, wastewater, and hydrocarbons,
- Impact on local services infrastructure (existing water supply pipelines on the Farm),
- Potential health and safety risks associated with mishandling of equipment (materials) as well as inadequate personal protective equipment,
- Potential dust generation from increased traffic in the area during site setup,
- Potential impact on archaeological/heritage resources through inadvertent unearthing of such sites or objects, and
- General environmental pollution through littering (general waste generated on the site).

4.2 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 2** – for the planning & design, construction, and subsequent operational and maintenance phase.

There will be some overlaps with regards to some potential impacts' occurrence during the construction 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 2**, 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 2: Management and Mitigation Measures for the Planning & Design, Construction 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	-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-Construction
Irrigation system Technology	Mechanical and design failures	-All manufactured materials will be required to bear the mark of SABS/SANS approval. -The Proponent should ensure that the irrigation machinery and equipment as well as associated accessories are designed in such a way mechanical failure are minimal to none. -The irrigation system's design should make provision for water conservation during irrigation.	-Approved design according to international standards -Sufficiently and appropriately designed irrigation systems	-Proponent (overall responsibility) -Planning & Design Engineer	-Technical Expert (Planning & Design Engineer) -Irrigation specialist	Pre-construction
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:	-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 construction and operations

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		- Water Supply Consent from NamWater - Road access from the B4 - Petroleum storage permits (if fuel is stored on site) - Required fertilizers, agricultural remedies, and other project related feeds. - Waste disposal authorization at the nearest municipality (Keetmanshoop).				
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) -Planning & Design Engineer	-Technical staff (Planning & Design engineer)	Pre-construction phase
Communication between the Proponent and surrounding land users	Lack of communication (proper liaison) between surrounding land users (communities) and Proponent	-The Proponent should appoint a Public Relation Officer (PRO) to liaise with local land users, when needed and required. -A clear communication procedure/plan which should include a grievance mechanism should be compiled.	-A PRO is appointed	-Proponent -PRO	-Grievance logbook -PRO appointment -PRO contact details to be provided to the affected residents -Local land users/communities	Prior to construction and throughout the subsequent phases
Employment	Creation of employment opportunities	-Non-skilled labour should be sourced from the Farm area, in accordance with procedures approved by the relevant authorities.	-Number and residence of locals employed	-Proponent -Construction Contractor -Site Manager	-Record of employees -Constituency Council office to	Pre-construction activities

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-Equal opportunity should be provided for both men and women.			assist in identifying unemployed people -Notification via the Keetmanshoop Rural Constituency Office	
Specialised procurement of services	Design, construction contractors, and services	-All services related to project activities such as construction 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 (//Karas Region) and lastly, nationally, or international, if all efforts lead to no success.	-Number of hired contractors	-Proponent -Construction Contractor	-Record of hired or contracted companies or services providers	Pre-construction As and when required for maintenance.
CONSTRUCTION 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 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 the as recommended below: ○ <u>Daily - construction phase</u> ○ <u>Bi-annually – for operations</u>	-Compliance monitoring conducted daily during construction -Bi-annual compliance for operations -Timely renewal of the Environmental Clearance Certificate (ECC) every 3 years	-Proponent -SHE Officer	-Monitoring reports ECC renewed on time. -Records of EMP training conducted	Throughout construction the and operation phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-An EMP non-compliance penalty system should be implemented on site.				
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 construction works and can be returned to its initial position, should be returned. This is to avoid unnecessary stockpiling of site soils which would leave them prone to erosion. -All construction pits excavated on site should be rehabilitated and returned to their pre-excavation state as possible. -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 on and around the site by driving everywhere resulting in soil compaction. -Access roads should be designed appropriately in a manner that disturbs minimal land areas as possible.	-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	-Tipper trucks and excavators to backfill trenches and pits	Throughout the construction phase operational phase

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-Make use of the existing road network as much as possible 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: *Identification of oil storage and use locations on site and allocate drip trays and polluted soil removal tools suitable for that specific surface (soil or hard rock cover) on the sites. *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.	-No complaints of pollutants on the soils -No visible oil spills on the ground or contaminated/pollution spots owing to construction activities.	-SHE Officer	-Soil pollution preventive resources such as kits, drip trays, awareness, etc	Throughout the construction and operational & maintenance phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		*The Proponent should develop and prepare countermeasures to contain, clean up, and mitigate the effects of an oil spill. This includes keeping spill response procedures and a well-stocked cache of supplies easily accessible. *Ensure employees receive basic Spill Prevention, Control, and Countermeasure (SPCC) Plan training and mentor new workers as they get hired in each phase of the project. -The site areas where hydrocarbons will be utilized, the surface should be covered with an impermeable plastic liner (e.g., an HDPE liner), carefully placed to minimize risk of puncturing, to prevent any spillages from getting into direct contact with the soils and prevent eventual infiltration into the ground and pollute groundwater. -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 -In cases of accidental fuel or oil spills on the soils from site vehicles, machinery and equipment, the polluted				

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		soil should be removed immediately and put in a designate waste type container for later disposal as per the preceding bullet point. The removed polluted soil should either be completely disposed of or cleaned and returned to where it was taken from on site or can be replaced with a cleaner soil. This is to ensure that the pollutants contained int the soil does not infiltrate into the site soils and eventually reach to groundwater. -In the event of a fuel (diesel) storage tank onsite in a tank mounted on a mobile trailer, drip trays must be readily available on this trailer and monitored to ensure that accidental fuel spills around fuel usage sites are cleaned up on time (soon after the spill has happened). -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 one of the following methods: *Discharged into chemical toilets and periodically emptied out before reaching capacity and transported to a wastewater treatment facility.				

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		*A type of pit latrine (where excreta in the pit is treated 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 such as recycle and re-use where necessary and possible. -The annual volume allocated by NamWater should be adhered to and if necessary, the Proponent should aim to only abstract/pump water when needed. -The Proponent should try to invest more in the Drip irrigation technique/system because it is less water demanding compared to the Centre Pivot. Alternatively, depending on the affordability, the two methods should be combined to reduce the pressure on the water supply source (Naute Dam). -Water storage tanks should be inspected daily to ensure that there is no leakage to minimize water wastage on site. -In the case that there will be consideration for a reservoir(s) on site, these should be covered to minimize water losses through evaporation. Thus, minimizing the need to abstract more water from the Dam to replenish reservoir losses.	-Proof or recording/quantification of water saving efforts.	-Site Manager (holds overall responsibility) -SHE Officer -Construction Contractor	-Monthly records of water used	During the construction and operational phases

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-Water conservation awareness and saving measures should be made to all employees and become accountable.				
	Water resources (quality) and pollution	<u>SURFACE WATER</u> -Consider carrying out construction works during the dry months of the year where potential surface run off from site to the nearby rivers is none. -All runoff materials such as hydrocarbons, wastewater and other potential contaminants should be contained on site in designated containers and disposed of in accordance with municipal wastewater discharge standards, so that they do not reach to water systems. -The irrigated land should be maintained frequently to ensure that no uncontrolled contaminated water leaves the site unnoticed by incorporating stormwater management into the site layout. <u>GROUNDWATER</u> -Stormwater management plans (discharge points) should be designed and implemented on site to prevent the potential contaminated run-off from reaching surface water resources, and or eventual infiltration into groundwater.	-Effluents contained and stored in designated containers.	-Proponent (holds overall responsibility) -SHE Officer -Construction Contractor	-Non-permeable material to cover the ground surface at areas where hydrocarbons and potential pollutants are utilized. -Designated waste storage containers	-Throughout all the project phases
Biodiversity	Loss of Fauna and Flora	<u>Flora:</u> -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	-Keep record of names of all protected plant species identified by an independent botanist/ecologist prior to site clearing.	-The Proponent -Site Manager -SHE Officer	-Barricading tape (to indicate working areas) -Technical Consultant (Botanist and or Ecologist) to help	-Throughout the phases -Botanist involvement prior to construction

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		protected species is removed. The plant species include the <i>Acacia Mellifera</i>. -Vegetation found on the site, but not in the actual project footprints should not be removed but left to preserve biodiversity on the site area. -No onsite vegetation should be cut or used for firewood related to the project's operations. The Proponent should provide firewood for his onsite camping workers from authorized firewood producer or seller. -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. -Workers should refrain from disturbing, killing or stealing locals' animals and/or small soil animals species found on site. -The poaching or illegal hunting of wildlife on the Farm and surrounding areas especially the Naute Game Park by either project workers or visitors is strictly prohibited. -Any project related worker or visitor that will be caught attempting to poach (illegally hunt) wildlife in the area should be reported to the Namibian Police	-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.		identify protected species -Anti-poaching Unit of the Namibian Police Force -Ministry of Environment, Forestry and Tourism (MEFT)	

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		Force' Anti-poaching Unit for further actions. -Environmental awareness on the importance of biodiversity preservation should be provided to the site contractors, workers, and visitors.				
Air Quality	Air quality (dust)	-The Proponent should ensure that the construction schedule is limited to the given number of days of the week, but not every day. This will keep the vehicle-related dust level minimal in the area, especially when it is windy (in dry months). -A reasonable amount of water should be used to suppress the dust that may be emanating from certain site areas (limited to the site only) or certain parts of the local utilized gravel roads that is generating a lot of 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.	-Dust suppression measures implemented --Visible efforts to curb dust	-Proponent -SHE Officer -Construction Contractors	-Grievance logbook -Dust suppression water tanks -Vehicle and machinery mechanic to ensure that vehicles and machinery do not emit harmful gases due to malfunctions	Throughout the construction phase

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-The vehicles carrying dusty materials should be covered to prevent materials being blown from the vehicle. -The transportation of project materials, equipment and machinery should be limited to certain days of the week only as so to reduce dust generated by heavy vehicles in the area. -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.				
Noise	Noise	-Noise from project vehicles and equipment on site should be reduced to acceptable levels. -Excavations and all activities that are likely to increase noise levels should be conducted between 8am and 5pm during weekdays. -The construction times should be set such that, no such activities are carried out during the night or very early in the mornings (to be limited between 8am and 5pm on weekdays). -When operating trucks such as hauling or any high noise level machinery, workers should be equipped with personal protective equipment (PPE) such as earplugs to reduce noise	-Weekdays activities during construction -PPE provided to workers operating noisy equipment and in noisy site areas.	-Site Manager -SHE Officer -Construction Contractor	-Clearly written placards with construction hours in a day placed at the turn off from B4 to C12	Throughout construction

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		exposure. These PPE should be regularly checked/tested for effectiveness and on detected malfunction, should be replaced as soon as possible.				
Health, Safety and Security	General health and safety associated with project activities	-The Labour Act's Health and Safety Regulations should be complied with. -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 accommodation areas and working sites. -Establish an emergency rescue system for the evacuation of injured people, if needed. -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 and materials on site as well as health and safety risk associated with their respective jobs. -Heavy vehicle, equipment and fuel storage site should be properly secured, and appropriate warning signage placed where visible.	Compilation of Comprehensive Health and Safety Plan.	-Proponent -Site Manager -SHE Officer -Construction 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
		-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 as this may lead to mishandling of equipment which results into injuries and other health and safety risks. -Workers should not be allowed on site if under the influence of alcohol. -The site to be equipped with "danger" or "cautionary" signs for any potential danger or risk area identified on site. -A security guard or guards should be part of the team so that they can look after the project equipment and vehicles that would be left on site in weekends or public holidays (when no work is done) to ensure that no unauthorized person enters the area. -All employees and contractors (personnel) to be trained on environmental awareness, the Proponent's internal Environmental Health and Safety Policy, Environmental Management Plan, and engagement with key stakeholders, specifically the key government ministries and residents.				

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
	Occupational Health and Safety	-When working on and moving around the site, employees and visitors should be properly equipped with adequate personal protective equipment (PPE) such as coveralls, gloves, safety boots, earplugs, dust masks, 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 -Bi-annual health and safety audits done.	-Site/Project Manager (holds overall responsibility) -SHE Officer	-Funds to acquire health and safety related equipment. and to pay for employee medical services -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	-Portable fire extinguishers should be provided on site. -No open fires to be created by project personnel. -Potential flammable areas and structures such as fuel storage tanks should be marked as such with clearly visible signage.	-No wildfires recorded (due to presence of workers)	-Site Manager -SHE Officer	-Fire extinguishers (1 per vehicle) and 1 per working site	Throughout construction and operational 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/heritage remains are discovered. -Identified of any archaeological significant objects on the site should not be disturbed but are to be reported to the project Environmental/Safety officer or National Heritage Council offices for further instructions and actions.	-Preservation of all artefacts that are discovered around project area -Cessation of work upon discovery/unearthing of unknown objects	-Site Manager --Construction Contractor -SHE Officer -Archaeologist	-Salvage equipment -Flag tapes -GPS (site marking) -Technical Staff/Consultant (Archaeologist to help identify and advise on	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
		-Workers should be educated to not destroy or throw away but report (to the environmental/Safety officer) of any unknown object found/discovered on site. -The worksite manager should familiarise themselves with the National Heritage Council's Chance Find Procedure (please refer to Appendix 1 of this document) and if uncertain about the procedure should receive training by a suitably qualified archaeologist with respect to the identification of archaeological/heritage remains and the procedures to follow if such remains are discovered throughout the project activities' duration.			heritage object discovery)	
Social conflicts	Job seeking, private property intrusion or damage	The Proponent should inform their workers (especially those from outside the site area) about the importance of respecting the locals' properties by not intruding or damage their homes or yard fences. -Any workers or site employees that will be found guilty of intruding peoples' properties should be called in for disciplinary hearing and/or dealt with as per their employer' (Proponent)'s code of employment conduct	-No complaints of property theft or damage related to project workers -More local workers who are familiar with the values, and way of living in the area	-Site Manager -PRO -SHE Officer	-Grievance logbook -Employment Code of Conduct	Pre- Construction

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-Site workers should be advised to respect the community and local's private properties, values, and norms. -No worker should be allowed to wander in people's private yards or fences without permission. -Site workers are not allowed to kill or in any way disturb local livestock or wild animals that may be seen on and around the site.				
Buried water supply pipelines	Damage or deformation of NamWater pipelined that through the Farm	-Excavation works on top and within the servitude of the water supply pipeline should be avoided at all costs. -The Proponent (if necessary, with a local NamWater representative) should mark the positions/route of buried water pipeline to avoid pipeline damage, especially that the pipeline runs through the Farm and particularly the irrigation site. -If possible, heavy trucks should avoid driving over farm areas that are known to have 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 -NamWater Regional Water Supply Coordinator	-None	Pre-construction
Littering and waste management	Environmental Pollution	-Project workers should be sensitized to dispose of waste in a responsible manner and not to litter.	-Site wide evaluation of the general condition of all waste storage sites must be	-Proponent -Site Manager -Construction Contractor	-Funds to acquire waste storage bins/	Throughout the phases.

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-After each daily works, there should not be waste left scattered on site, but rather be disposed of in allocated site waste containers. -No waste may be buried or burned on site or anywhere else throughout the project lifecycle. -All domestic and general waste produced daily should be contained until such that time it will be transported to designated waste sites in Keetmanshoop on a weekly basis. -The sites should be equipped with separate waste bins for hazardous and general waste/domestic. -Waste separation at source will be enforced by availing clearly labelled or differently coloured general waste (paper, plastic, organic waste) rubbish bins at all working areas. These must be emptied weekly at the nearest registered waste dumping site in Keetmanshoop. -A penalty system for irresponsible disposal of waste on site and anywhere in the area should be implemented.	conducted as part of the bi-annual environmental audits -A register of all waste generated on site is kept on site. -All waste disposal permits from relevant authorities are available on site. -No littering on and around the project site	-SHE Officer	drums; and transport all waste from the site. -Waste storage containers	
	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

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
	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 (e.g., the Health and Safety 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. -All waste disposal permits from relevant authorities are available on site	-Proponent -Construction 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 or twice a week only, but not every day. -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 and access permits obtained from the Roads Authority. -Drivers of all project phases' vehicles should be in possession of valid and appropriate driving licenses.	-Site access road permits obtained, and requirements fulfilled -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 loading zones are on sites	-Site Manager -SHE Officer -Construction 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 construction works

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
		-Vehicle drivers should adhere to the road safety rules. -Drivers should drive slowly (40km/hour or less), and 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. -Sufficient parking area for all project vehicles should be provided for and clearly demarcated on sites. -The Proponent should make provision for safe materials and equipment offloading and loading areas on sites. -No heavy trucks or project related vehicles should be parked outside the project site boundary or demarcated areas for such purpose. -The site access roads should be equipped with road safety signs.				

Aspect	Impact	Mitigation Measure(s)	Key Performance Indicator (KPI)	Responsible Person	Resources	Timeline
Social nuisance	Job seeking and clashes due to differing norms, culture, and values	-Priority of employment should be given to local people, and only if necessary and due to lack of skills in the area, out-of-area people can be given some of the work. -The locals to be employed during the project phases should be provided with the necessary training of skills required for the project to avoid bringing in many out-of-area employees. -Out-of-area workers that may be employed (due to their unique work skills) on site should be sensitized on the importance of respecting the local values and norms, so that they can co-live-in harmony with the local communities during the duration of their employment on site	Correct and fair recruitment procedures are followed and practised. More local people are employed for both skilled, semi and unskilled works. Out-of-area people only employed for specialized skills that are not found in the project area. No complaints of unfair recruitment procedures. Grievance and response records	-Site Manager -Construction Contractor -PRO	-Records of employees and their places of origins in relation to the site area	Pre-construction In special cases, during the project phases, depending on the project needs.

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	-The workers should be engaged in 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 at camps	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 objectmust 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.